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Automotive Industries

GEO. D. ROBERTS
Advertising Manager

Cable Address .....Autoland, Philadelphia
Telephone .....Sherwood 1424

OFFICES

New York—U. P. C. Bldg., 239 W. 39th St., Phone Pennsylvania 0080
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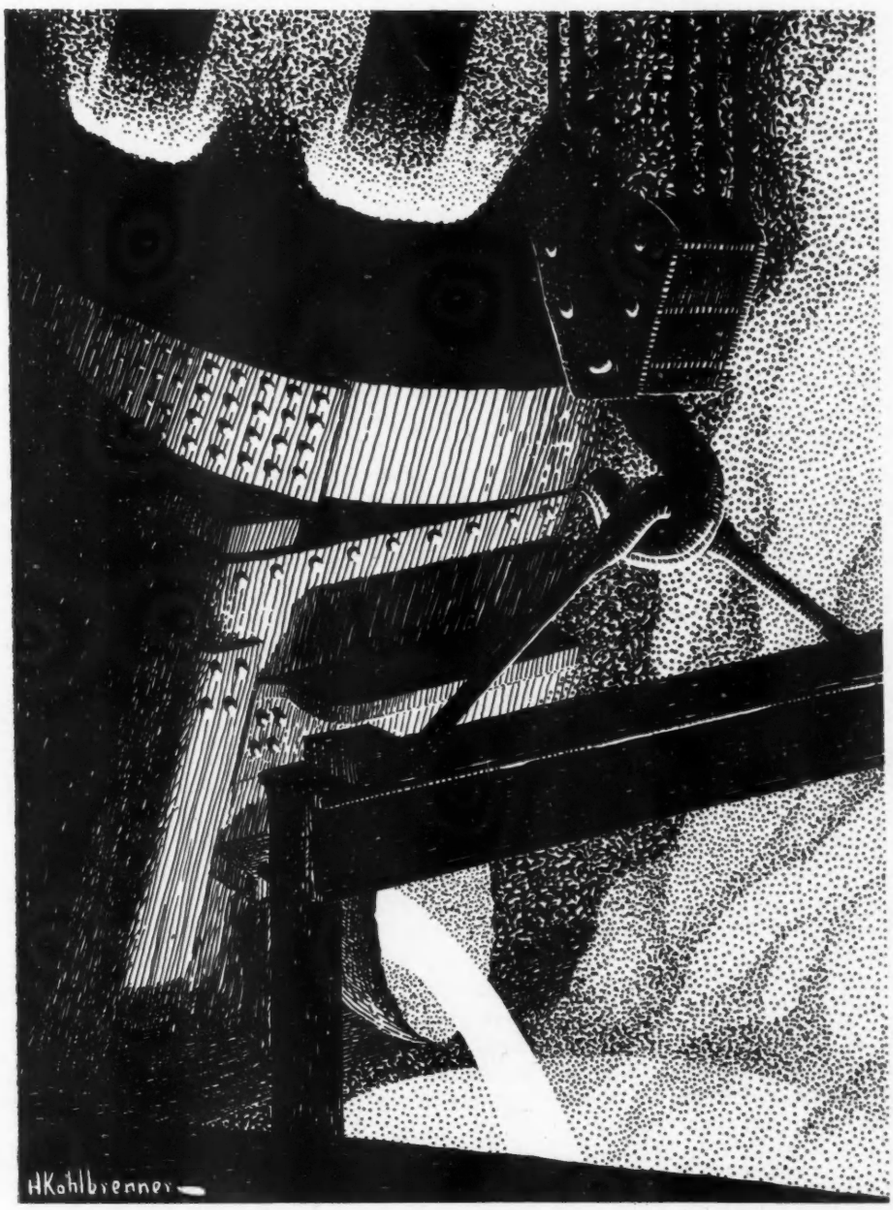



# 1930 Closing With Metal Markets at Subnormal Level

By
William Crawford Hirsch

THE 1930 metal market was on a strictly "pay as you go" basis. In steel, the gradual recession from the 1929 output of nearly 55,000,000 tons for all industries to the 41,000,000 tons approximately 1930 production, was accompanied by successive price declines ranging from $6 a ton for steel bars to $12 a ton for full-finished automobile sheets.

Pig iron, following resistance to pressure on prices during the first half of the year, gave 'way during the second half to the extent of about $2 a ton, the year's output being estimated at 31,000,000 tons as compared with 42,500,000 in 1929.

Because much of the copper output during the first three months of the year (when it was quoted at 18 cents), was added to surplus, prices began to melt with the snow and kept on melting during the midsummer's dullness. In October copper sold at times at only a fraction over 9 cents, or one-half its price during the first quarter. Tin receded to the lowest price of the century. Lead and zinc prices also were on the toboggan.

## Steel Products Prices

| | Jan. 2, 1930 | Dec. 17, 1930 | Five Years' Average |
|---|---|---|---|
| Steel Bars | 1.90 | 1.60 | 1.87 |
| Black Sheets | 2.75 | 2.35 | 2.80 |
| Blue Annealed Sheets | 2.30 | 2.05 | 2.15 |
| Automobile Sheets | 3.90 | 3.30 | 4.05 |

Were it not that the price movement had so impressively kept step with the decline in demand, there might be something disquieting in this picture. As it is, it reflects a natural market condition. The heavy rate of consumption during 1929, especially that coming from the automotive industries, had left a tendency in some quarters of the metal market toward a *laissez faire* attitude. With prices what they were in 1929, obsolescence of equipment and of marketing methods still had a chance to exist by the side of modernized mills and constructive merchandizing.

As a new chapter in economic conditions began to unfold itself during the second quarter of 1930, those with any but the most highly mechanized equipment found themselves gradually getting more and more into the "red," and toward the end of the year even those steel producers who are integrated from ore to the finished material found going prices for ordinary sheets, strip-steel, and wire products as at best yielding a new dollar for an old one. The end-of-the-year market has not an ounce of adipose adhering anywhere. What there was to be shed fell away in 1930. The market paid as it went—lower and lower.

As for the status of the automotive industries in the steel market, it remains but little changed as the result of the lesser tonnage required for the smaller number of automotive units produced in 1930. Demand for steel from railroads and for building was also backward, so that rail and shape mills catering especially to the demands of these classes of consumers did not fare very much better than bar, sheet and strip mills whose leading customers continue to be automotive consumers.

Second to the electrical industry automotive consumption furnishes the most important outlet for copper. It continues, of course, to be the dominant factor in the absorption of aluminum, more than three-quarters of the automotive units produced in 1930 having aluminum pistons. Not a little of the recent weakness of the tin market resulted directly from the slowing down of automotive demand, consumption in the automotive field continuing to be fully as important as in tin plate for food containers.

Making due allowance for the slower pace of automotive demand, the use of nickel in nickel-alloy steels and in automotive castings continues as one of the most important outlets for that metal. Nor has the position of the automotive industries as one of the important users of lead and zinc been affected by the 1930 recession in tonnage consumption, a condition forced upon all consuming industries alike by the general economic situation.

The steel market's course needs but brief review, the mile-posts on the journey toward lower price levels having been more or less inconspicuous and the down-grade provided by the general economic situation. During the first month of the year steel production was at about 75 per cent. Buyers were extremely conservative from the very outset. Bar prices sagged to the extent of about $1 a ton, and sheet and strip mills, following a very poor demand during the closing months of the preceding year, were falling over one another to get as large a slice of the first quarter business.

Black and blue annealed sheets yielded $1 and $2 per ton, although the volume of buying was improved. Strip mills, having been on especially short rations in December when they worked at about one-third of capacity, added considerably to their backlog, doubling it in some cases, but in doing so had to make price concessions on half-way attractive business.

Full-finished automobile sheets had been lowered by $1 a ton to 3.90 cents, Pittsburgh, in December, and were rather quiet in the first two months of the year. In March they dipped to 3.80 cents, Pittsburgh. Efforts to put across an advance in black and blue annealed sheets in March proved a failure.

Hot-rolled strip demand broadened to about two-thirds of capacity in March, while that for cold-rolled dipped to about one-third, prices for round tonnages contracting under the scramble for business. The steel bar market slipped under the influence of concessions, the market in April being quoted at 1.80 cents, but a good deal of business being done on a 1.75 cents, Pittsburgh, basis.

Somewhat better sheet demand from automotive consumers developed in April, but weakness had by that time affected the entire price structure, and full-finished automobile sheets could be bought at 3.70 cents, Pittsburgh. Midsummer brought no improvement, sheet orders being barely sufficient to keep plants operating at half capacity. Full-finished automobile sheets shed another $2 per ton in July, the black and blue annealed yielding ground to the same extent.

The recognized market for steel bars became 1.65 cents, Pittsburgh, without putting a stop to shading by those more eager for business than others. As a result, October found 1.60 cents, Pittsburgh, the top of the market. Prices for other steel products kept on melting away, until in November the leading interest's bar and sheet subsidiaries proclaimed that

## Metal Prices

| | Jan. 2, 1930 | Dec. 17, 1930 | Five Years' Average |
|---|---|---|---|
| Aluminum | 23.90 | 22.90 | 24.75 |
| Copper | 18.00 | 9.75 | 14.80 |
| Tin | 39.65 | 23.85 | 51.40 |
| Lead (New York) | 6.25 | 5.10 | 6.75 |
| Zinc (E. St. Louis) | 5.45 | 4.00 | 6.15 |

the lowest going prices were being met, but that they constituted most emphatically the irreducible minimum.

Early in December, the leading interest's heavy rolled products subsidiary announced a $1 per ton advance in the price of steel bars, plates and shapes. It had been expected that this would be followed by upward revision of prices for sheets, but for one reason or another no move in this direction was made during the first half of December.

Steel buyers are not philanthropists. Neither are they unmindful of the effect on their own business of abnormally low steel prices, looked upon, as steel is, as the key to the commodities situation.

Some first-quarter 1931 business had been placed early in December at the low prices then in vogue, and eager as producers were to improve their position, announcement of an advance would at best have applied to only a part of the first-quarter takings. When consumers are covered for part of their next quarter's requirements, they are in no hurry to place additional commitments at higher prices.

This outline of the 1930 steel market's history would not be complete without mention of further extension of productive facilities in the Detroit area* and of projects pending to make the hub of the automotive industries still more self-contained in its steel supply. Because of the sharp decline in the stock market, some of the merger and unification plans aiming at increased production of finished steel at Detroit's front door with low cost raw material sources as basic links, have for the time being been put on the shelf.

## Detroit Mill Development Delayed

From a market point of view, the growth in the automotive demand for the nickel-chromium type of so-called "stainless" steels is noteworthy.

The wide-awake steel marketer of today knows that except for the rare periods of mass buying and so long as capacity is as ample as it is, it is a herculean task to maintain prices for staple tonnage products on a half-way profitable basis, but that there are still commensurate rewards in the field of specialty steels sold on a quality basis.

The tendency in the steel industry to devote more and more energy to the marketing under proprietary names of specialty steels was one of the year's outstanding features.

The present-day waste of the material in abandoned and discarded cars continues to be nothing short of an economic crime. The argument that because pig iron happens to be cheap just now, scrap from disused cars is an encumbrance and, therefore, should not be salvaged, is of a piece with the notion that a window-smasher is to be commended for increasing the sales of the glass industry. Subnormal as metal prices are at present, some day we will pay and pay heavily for this wastage of scrap material.

The outstanding developments in the aluminum market during 1930 were the lowering of import duties to the extent of 1 cent a pound on crude, scrap and alloys and 2 cents a pound on sheets, circles, disks, etc. This resulted in a reduction by 1 cent a pound in the price for virgin ingots and corresponding reductions in other forms of aluminum. The European Aluminum Cartel announced a reduction of £10 sterling in October, the equivalent of 18 cents per pound. With the duty of 4 cents, this would have brought the cost of imported metal to 22 cents exclusive of shipping costs, insurance, etc., so that the prevailing quotation in the domestic market of 22.90 cents was not affected.

Remelted aluminum, however, chiefly because of at times extraordinarily heavy supplies of scrap, receded from 22 cents at the beginning of the year to 17 cents toward its close. The domestic producer is building a large rolling mill for sheets and similar products. A new low thermal expansion piston alloy has recently been brought out.

What was perhaps the year's greatest upheaval took place in the copper market. During the first three months of the year the producers managed to hold the price for electrolytic at 18 cents, delivered Connecticut, and 18¼ cents, delivered Middle West points. The first sharp break to 16 cents came in April. By May 13 cents had been reached, and from then on one break followed the other until in October refiners sold at as low as 9½ cents. Several times producers attempted to halt the decline, but what with custom smelters compelled to dispose of heavy tonnages, surplus stocks having risen from 45,000 tons in October, 1928, to 365,000 tons two years later, the benefits from curtailed production were slow in making themselves felt. Amid curtailed consumption, growing African competition and the unfriendly attitude of European copper buyers, producers were powerless to turn the tide, and there was copper to be had during the third week of December at 9¾ cents.

Tin, which sold at 39⅝ cents at the beginning of the year, was offered on Dec. 15 at 23¾ cents, virtually a record low for the century. The decline was the aftermath of overproduction and unwieldy stocks. Curtailment of production was decided upon by Straits Settlements producers many months ago, but meanwhile consumption has slipped still lower.

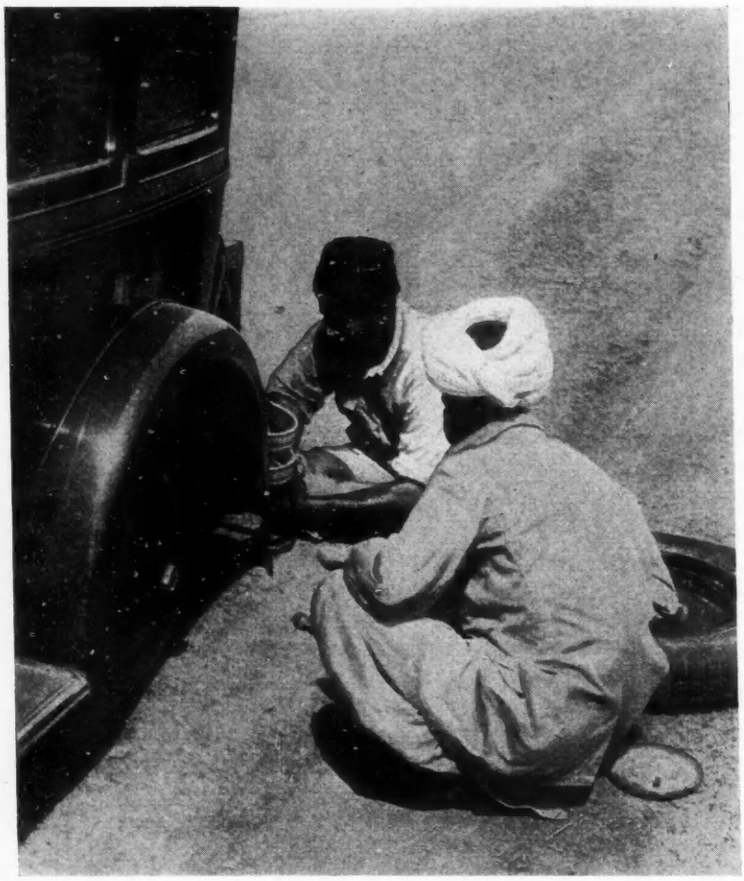
Nickel sold uniformly throughout the year at 35 cents, the leading interest devoting all efforts to the developing of a still broader sphere of usefulness for the metal.

## Metals Used in Automotive Plants

| | Tons—1930 | Tons—1929 | Tons—1928 |
|---|---|---|---|
| Copper | 85,000 | 160,000 | 135,000 |
| Zinc | 25,000 | 34,000 | 27,000 |
| Tin | 12,000 | 21,000 | 19,000 |
| *Lead | 141,000 | 215,000 | 160,000 |
| Aluminum | 23,500 | 37,000 | 25,000 |

* Estimated, including use of lead in storage batteries.

* "Steel Mills in Detroit Area." Automotive Industries, Sept. 13, 1930, page 362.



# An Intelligent

by H. H. Kelly *

Every foreign dealer should have in his employ men who have attended a factory service school + + + +

FOR the first time since 1921, the export branch of the American automobile industry this year has experienced a marked depression. Total foreign shipments for 1930 will be only half those of the record year 1929.

The seriousness of the situation has been aggravated by the simultaneous, although less severe, decline in the domestic market. It was a cherished theory of many export men that both foreign and domestic demand for automobiles would not be likely to recede at the same time, yet this theory has gone by the board in the present world-wide slump.

It is only natural that in the general throwing-out of cargo which has resulted, the export section of the industry, whose net foreign sales have not yet accounted for much more than 10 per cent of total production, should have lost heavily. It is more to be regretted that this year of poor business should have shaken the spirit of confidence upon which the whole promising structure of foreign sales had been reared.

Despite all the learned articles and pretty speeches of recent years, there exists today in many quarters a feeling of skepticism about the future of automobile exports. Is this skepticism justified by the facts?

"In the automobile industry," a noted authority once said, "nobody's memory goes back farther than the day before yesterday."

Many, at least, have shown little desire to recall the unbroken rise of the export business, or to view that remarkable record as what it truly is—an augury for the future. Yet it is a fact that no department of the American automobile industry has had a more brilliant growth than that of foreign sales, with a net increase of 260 per cent in eight years.

Development of exports to date falls naturally into three periods.

The first period covered the two decades beginning with 1902, in which year automotive shipments to countries outside the United States first approached the million-dollar mark and were given a separate classification in the government customs statistics.

It's a far cry from that distant time to the year 1929, when the total automotive exports from the United States were worth $540,000,000. Then, serious competitors for foreign business were few, and comparatively little attention was given to the building up of markets abroad save by two or three outstanding producers. This era culminated in the abnormal post-war year of 1920, with net foreign sales of American passenger cars approximating 150,000 units, and the closely-following slump of 1921.

The second period is the one which ended last year: Eight years of unbroken increase in volume, and mounting ratio of exports-to-pro-

* Formerly U. S. Automotive Trade Commissioner to Europe, and special export representative, Hudson Motor Car Co.

# Program For Each Foreign Territory Will Insure the Future of Exports

## The immediate present affords a rare opportunity for mapping future plans in overseas markets

### The Story of a Prosperous Period in U. S. Exports

| | 1922 | 1929 | % Increase |
|---|---|---|---|
| Net foreign sales of American passenger cars | 133,000 | 481,000 | 260% |
| Total production of American passenger cars | 2,405,000 | 4,603,000 | 91% |
| Ratio of foreign sales to production | 5.4% | 10.5% | |

Note: Because of the complex factors involved, statistics published on the foreign trade in American automobiles are often unintentionally misleading. Figures here cited have been compiled on the only basis which permits of an accurate picture of our foreign business. They represent "net wholesale sales of American passenger cars in the foreign market." The foreign market comprises all countries outside the United States and Canada. (Canada is properly considered a domestic market for obvious reasons, chief among which is the fact that is supplied almost exclusively by United States manufacturers either through direct shipment or through branch factories, part of whose output is also exported to foreign countries.) Accurate statistics on sales in the true foreign market, therefore, are arrived at by combining the exports of passenger cars and chassis from both the United States and Canada, subtracting the shipments exchanged between these two countries (regarded as domestic sales), and finally adding the number of cars sold from the foreign assembly plants of American manufacturers.

For the purposes of this article, discussion is limited to passenger cars, since such vehicles comprise over two-thirds of the total exports of automotive vehicles, and are the chief interest of the majority of American producers. Inclusion of trucks, foreign sales of which have not declined to as great an extent as passenger cars, would entail a separate study. It might be stated, however, that the light trucks popularized by several leading passenger-car makers have proved a valuable back-log for their foreign operations, especially under present conditions.

duction, lasting from 1922 to 1929. Practically every producer sought for a share of the profitable foreign business. Leading companies rapidly increased their investments in assembly plants and warehouses abroad and expanded their export organizations. Total sales grew steadily, riding over the two minor domestic set-backs of 1924 and 1927, and automotive products became the principal manufactured exports of the United States.

The striking figures, shown in accompanying table, on growth of foreign sales, are further borne out by the increase in registrations abroad, which show that the automobile wealth of the export market quadrupled during these years. At the end of 1922, the total number of passenger cars in operation in all countries outside the United States and Canada was 1,350,000—at the end of 1929, 5,300,000.

It is noteworthy that competition of foreign manufacturers (chiefly centered in Europe) did not strengthen materially in this period, their share of world production having ranged from 8.7 per cent in 1924 to 14.2 per cent in 1927, and fallen again to 10.6 per cent in 1929. America consistently remained the chief source of supply for practically all foreign markets outside the few producing countries of Europe.

The third period in the record of American automobile exports, and one certainly destined to be more important than those which have preceded it, has begun this year under difficult conditions. Net foreign sales of all types of American passenger cars will probably total a little short of 250,000 units, or about half the 1929 volume. That all producers have shared in this decrease is shown by United States export statistics for the first nine months of the year: shipments of complete cars and chassis, which still comprise over two-thirds of the total exports, were 45 per cent of the 1929 (nine months') figure; and shipments of automobile

**Conditions in foreign markets are different and should be carefully studied**

parts for assembly, chiefly representing two low-priced makes, were 55 per cent of 1929.

So much has been written about the causes underlying this sudden and drastic decline in foreign sales that it would be superfluous to analyze them here. It is self-evident that when a combination of over-production and low prices exists in such basic commodities as sugar, rubber, tin, silver, raw silk, coffee, wool and wheat, the buying power of great producing areas which are among our best customers must be vitally affected.

Add to these facts the political unrest prevalent in numerous countries during the past year, and even civil warfare in some quarters, due in large part to these same economic causes; finally, add the slowing-down of business in the United States, which has been well termed the "balance-wheel of the world-machine"—and the slack business of the past year is seen to be inevitable.

Certain countries might be cited as showing the diversified causes for the existing situation: Australia—weakened financially by over-borrowing, record low prices for staple crops, an ultra-protectionist labor government; Brazil—coffee; Argentina—political disturbances, low prices; Cuba—sugar; India—internal unrest; Dutch East Indies—rubber, sugar; China—civil warfare, declining price of silver.

Important as was this basic factor of depressed general business, over-expansion on the part of some of the principal producers also contributed to unfavorable conditions. At the beginning of 1929, there were more than 50 assembly plants in operation by American automobile manufacturers in all parts of the world, as well as a considerable number of factory branches with stocks of cars. Over-estimation of markets supplied through these foreign operations led to heavy production schedules and stocks, and a consequent forcing of cars upon retail outlets. The carry-over at the end of 1929 was heavy, and in some cases continued well into 1930. It is this fact which has been particularly disturbing to numerous producers, and which has led to drastic curtailment in some of the largest organizations, and even abandonment of certain assembly plants and foreign branches.

Notwithstanding the general darkness of the picture, it is not altogether black, for here and there signs of the lifting of the storm have begun to appear. Thus, during the first nine months of 1930, which furnish a close approximation of the entire year, shipments of complete passenger cars to Denmark and the Netherlands have exceeded those of the corresponding period last year; and shipments to Switzerland, Mexico, Venezuela and the Philippine Islands have held almost level. Passenger-car parts for assembly have increased to Mexico and New Zealand, and are close to the 1929 figures in France, Spain, United Kingdom, Chile and British South Africa. During the autumn months, sales in Argentina have greatly strengthened, and this very important market appears to be among the first on the road to recovery.

While exports of trucks up to 1-ton capacity are only about one-fifth those of 1929, the category of "trucks over 1 ton to 2½ tons" shows an increase of 12 per cent over last year, and that of "trucks over 2½ tons" is up 33 per cent. The cheap 1½-ton truck remains an important factor in the overseas trade.

So, with the bottom apparently reached and the first signs of improvement beginning to brighten the horizon, we arrive at the end of 1930. What of the immediate future?

Certain facts are basically encouraging. World commodity prices are at a low level and most of them have been holding firm for several months, while production has diminished and stocks have decreased. Unlike the situation in 1921, when declining currencies abroad were a very grave problem, foreign exchange in general has withstood the storm remarkably well and many currencies are higher today than last year. Increased efficiency and lowered costs have been brought about in almost all lines of production, both of natural and manufactured products. Replacement demand for cars and parts is inevitably growing. New-car demand also, it may be assumed in view of the eight recent years of increasing sales, is only pent-up under present conditions, ready for release at the first opportunity.

As regards automobile organizations, the overstocked position of producers and retail outlets has been greatly improved during 1930, and a closer watch is today being kept on current sales and stocks abroad than ever before. In this respect, the future is bright with promise of profitable operations. Retrenchment of sales organizations both in the field and at factory headquarters has proceeded to a point where further reductions would seem difficult. The decks have been effectually cleared for the next action.

The time has about come for a rebirth of confidence—the same confidence which developed the domestic market in the face of frequent forebodings that "the end had been reached"—and the establishment of a common-sense export program which will seek increased profits through greater efficiency in factory, distributor and dealer organizations.

The first signal for the beginning of a new upward swing in foreign sales will doubtless be the improvement of business in the United States, that balance-wheel to which the rest of the world is now so closely geared. But without risking predictions as to the date of that happy event, it is apparent that the immediate present affords a rare opportunity to many an organization for mapping future plans and correcting recognized weaknesses.

Closer relationship is needed between the factory and its foreign contract-holders. Who can say how much the efficient distributor organizations of the United States and Canada owe to the constant contact and cooperation of factory officers, a form of assistance which export dealers have all too seldom received? Especially is such cooperation needed in times like the present, when the feeling of discouragement prevalent abroad is even greater than in this country.

As one experienced observer recently commented: "Unfortunately, certain American companies have lost greatly in prestige abroad during the last few months. In some places, this has been used against all American lines. The loss has been caused largely by frequent personnel changes, apparent lack of sympathy with dealer aspirations, and overstocking. On the other hand, some lines have greatly increased their prestige, through cultivation of dealer good will, and are stronger than ever before." If foreign staffs have been reduced, the duty devolves upon headquarters to maintain as close contact as possible with its foreign connections by letter and cable and telephone, and to show a helpful and practical interest in their welfare.

Essential to future progress is an intelligent and consistent program for each individual foreign territory. Now, more than ever, is exact information about foreign connections desirable. What is the condition of the distributor's or dealer's capital resources—territory—premises—sales organization—service — stock — advertising — retail prices? Every element of the problem is known, yet few are the export departments that know exactly in which of these respects their agents are strong or

**Essential to the foreign agency is a consistent and intelligent program of factory cooperation + + + +**

weak, and what is being done about it.

Establishment of a method for registering the existing facts about every export territory, outlining a program for improvement, and then checking progress as made, is a simple matter. Yet only in some such way as this can headquarters' executives determine what effort should be put forth in any market to accomplish their simply-stated but intricately-compounded objective, the improvement of competitive standing. Hardly could a better time than the present be found to lay the groundwork for such a program.

**While exports of trucks up to one-ton capacity are only one-fifth those of 1929, the category of "trucks over 1 ton to 2½ tons" shows an increase of 12 per cent over last year, and that of "trucks over 2½ tons" is up 33 per cent. The cheap 1½-ton truck remains an important factor in the overseas trade.**

Weaknesses in the distributor and dealer set-ups are at once revealed by such a method as above outlined, and the resulting "program of improvement" must have either a promptly stimulating effect or prepare the way for necessary changes of representation in a fair and open manner. To mention only one of these weaknesses, but a cardinal one, the lack of dealer and sub-dealer representation for many important producers is evident. The building up of a second line of defense providing adequate coverage in each territory will be one of the chief long-term jobs of the period now beginning, and will command the best brains and energy of both headquarters and field staffs.

The problem of an advertising and literature policy which will be satisfactory to all concerned still awaits solution. The trend, however, is clearly toward the factory's assuming complete control of foreign advertising, which entails new responsibilities and opportunities for the headquarters organization.

Reducing boxing and shipping costs, and the encouragement of modified assembly operations by distributors, still provide possibilities of further reductions in retail prices abroad.

Possible advantages of an export assembly line where volume justifies it, in which the individual requirements of foreign distributors can better be met than in the domestic assembly process, merit close study. Much still remains to be done in catering to the reasonable demands of foreign distributors for variety of colors, special equipment, etc.

Traveling service men in export are expensive to the factory, and the limited time they can spend in any one place handicaps their work. Better results would likely be achieved by insuring that every foreign distributor and important dealer have in his employ a serviceman who has attended the factory service school, and arrangements to this end would not be difficult if the factory gave specific encouragement.

To sum up, the greatest contribution any factory could make to its export development would be to regard its foreign agents as more nearly on a par with its domestic agents than in the past—entitled in the fullest measure possible to the same helpfulness in merchandising problems, in accounting and service, and in general sales-promotion activities.

The period upon which the automobile export industry is now entering will be one of scientific selling, entailing accurate knowledge of foreign markets, a close watch upon retail stock and sales, an intelligent plan for improving sales outlets, an efficient personnel in the field and an export-minded executive organization at headquarters. To meet these requirements, American producers now possess a background of experience and profitable operations which place them far ahead of that earlier year of discontent, 1921.

The mechanical superiority and price advantage of American cars have not declined. The desires of potential car owners abroad have not diminished. As the changeless economic laws produce a new upward swing of the pendulum of prosperity, foreign markets will begin to buy again, and to buy in greater quantities than ever before. Those producers who visualize 1931 as a year of opportunity for laying new foundations for increased export business will be the first to profit in the new era.

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## Publications Received

Ice Formation on Aircraft and Its Prevention. By Merit Scott. The Franklin Institute, Philadelphia, Pa.

Thermometric Lag of Aircraft Thermometers, Thermographs and Barographs. By H. B. Henrickson, Bureau of Standards Research Paper No. 222, Superintendent of Documents, Washington, D. C.

Stresses Due to the Pressure of One Elastic Solid Against Another. By Howard R. Thomas and Victor A. Hoersch. Bulletin No. 212 of The Engineering Experiment Station, University of Illinois, Urbana, Ill.

The Torsional Effect of Transverse Bending Loads on Channel Beams. By Fred B. Seely, William J. Putnam and William L. Schwalbe. Bulletin No. 211 of the Engineering Experiment Station, University of Illinois, Urbana, Ill.

The Resistance of Steel to Abrasion by Sand. By Samuel J. Rosenberg. Research Paper No. 214 of the Bureau of Standards. Superintendent of Documents, Washington, D. C.

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SIR ARTHUR STANLEY, who is president of the (British) Tramways and Light Railways Association, has been appointed president of the Institute of Transport. This institute looks after the interests of all forms of transport, including railways, roads with their rail vehicles, motor and other road vehicles, canals, tramways and aviation.

# Seven Nations Represented at French Aeronautical Exhibition in Paris

Three-engine Latecoere 10-passenger monoplane

## Development of the air-cooled Diesel aircraft engine and monoplanes dominate the show at the Grand Palais + + +

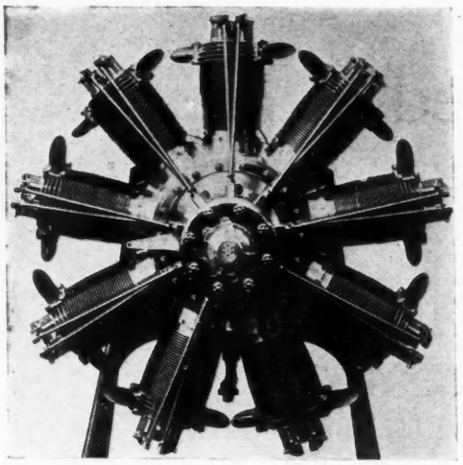
by W. F. Bradley

ALL-METAL construction, an increased number of monoplanes, new engines, the majority of them being air-cooled, and the development of the Diesel engine for flying machines are the outstanding features of the French aeronautical exhibition, held in the Grand Palais, Paris, from Nov. 29 to Dec. 14. The show has an international character, with the exhibit of planes and engines of French, English, Italian, German, Austrian, American and Czecho-Slovakian origin.

Very few of the Diesel engines are in regular production; several have flown, many more have been completely developed experimentally by their makers, and at least one, the Junkers 500 hp. six-cylinder two-stroke, has gone through an official 50-hr. test.

The Junkers is a straight six, opposed-piston, two-crankshaft construction, having a height of 63 in. The cylinder bore is 120 mm., with a total piston stroke of 210 mm., and was described in the Jan. 25, 1930, issue of *Automotive Industries*. During the official 50-hr. test carried out this year by the Cina, in Berlin, the average power output was 458 hp. at 1610 r.p.m., with a fuel consumption of 0.374 lb. per hp.-hr. and an oil combustion of 0.03 lb. A test of one hour was made at 1620 r.p.m., with an output of 524 hp. and a fuel consumption of 0.372 lb. A half-hour test was made at 1719 r.p.m., 448 hp. being developed, and the fuel consumption being 0.387 lb.

Probably the most advanced of the French Diesel engines is the nine-cylinder radial Clerget shown on the stand of the Panhard & Levassor Co., side by side with sleeve-valve engines. Panhard has secured a manufacturing license for this engine, which is one having flown on several occasions. It has a bore and stroke of 120 by 130 mm., steel cylinders with aluminum alloy heads carrying vertical valves operated by pushrods and rockers from a ring cam just behind the propeller and was de-



Clerget nine-cylinder radial air-cooled engine shown by Tanhart & Levarson

scribed in *Automotive Industries* in the Nov. 29, 1930, issue. The fuel pump and distributor are at the rear.

Another radial air-cooled Diesel is shown by Lorraine-Dietrich but is admittedly in an experimental stage, all the information given regarding it being that it develops 250 hp. It has steel cylinders with separate head, the barrel being held down on studs and the head carrying two inclined and inclosed valves operated by pushrods and rockers.

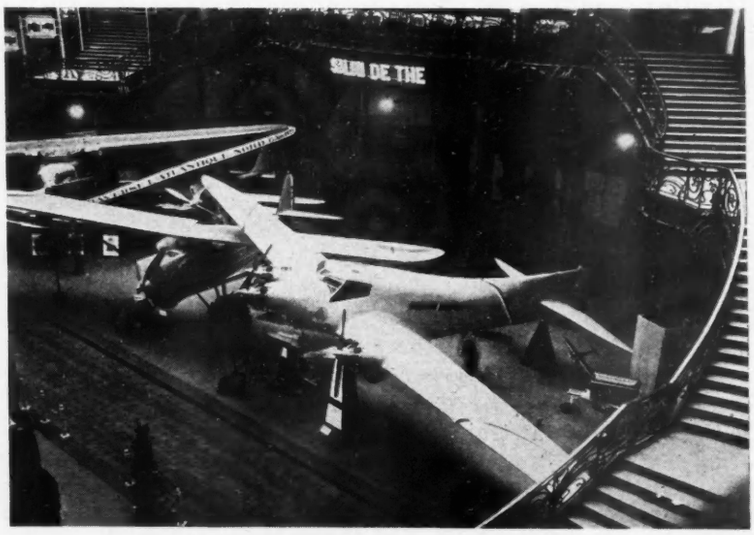
The Coatalen six-cylinder, water-cooled, heavy-oil engine is shown on the stand of the Weymann Co., which firm is conducting an aviation department in conjunction with Lepere. Up to the present the Coatalen does not appear to have flown; experiments are being continued and will in future be carried out in France by the Weymann Co. A nine-cylinder, air-cooled radial Diesel is also shown by Renault, but indications are that it has not yet got out of the experimental stage. Fiat has produced a six-cylinder Diesel, but does not have it on exhibition.

With several new models added, radial air-cooled engines are more numerous than ever. Apparently the only firm confining itself to water-cooled types is Rolls-Royce. The biggest single air-cooled unit in the show is the Armstrong-Siddeley 700-800 hp. 14-cylinder Leopard, which has a bore and stroke of 6 x 7½ in., a compression ratio of 5, and is fitted with a reducing gear with a ratio of 0.657 to 1. This engine was described in the March 29, 1930, issue of *Automotive Industries*.

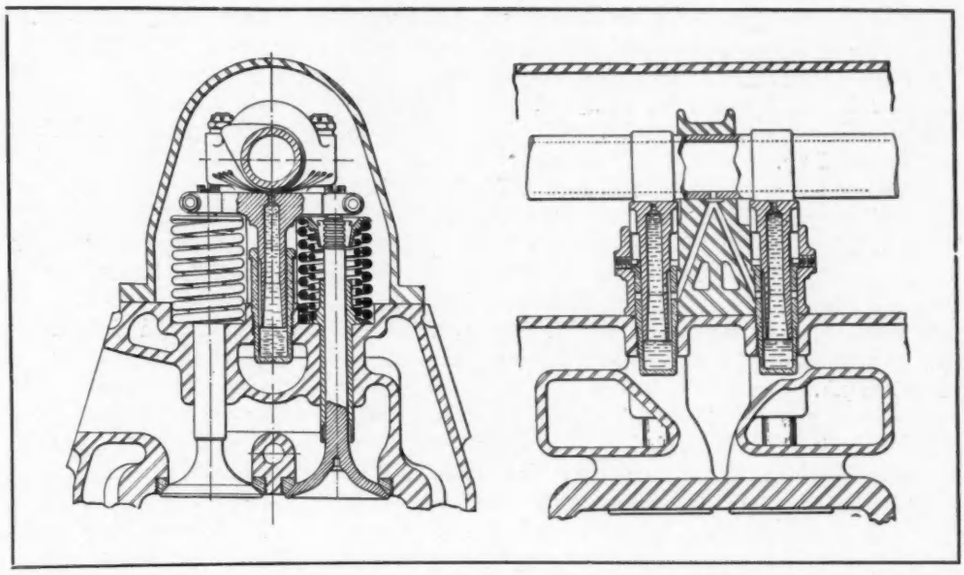
Farman has come out with two radial air-cooled models, of the same general design, one having seven and the other nine cylinders. They have steel cylinders with a screwed-in head, and inclined valves operated by pushrods and rockers. Renault has a vertical four air-cooled model for school planes, and a radial seven-cylinder. Lorraine-Dietrich has added a nine-cylinder 300 hp. radial to its line and is about to present a 14-cylinder 500 hp. model for official government tests. Hispano-Suiza builds the Wright air-cooled engine, apparently the only difference from the American model being the use of nitralloy steels. Isotta-Fraschini has two air-cooled jobs: a six-cylinder vertical for school planes and a 12-cylinder V for scout machines. Fiat shows only one air-cooled model, a comparatively low powered radial, while Alfa Romeo is producing an air-cooled model under Bristol license.

While continuing the production of Jupiter engines under license, Gnome & Rhone has brought out two engines of its own design, known as the Titan and the Titan Major, the former having seven and the latter nine radial cylinders. Both are remarkably interesting jobs, designed with many of the parts in common, having an excellent grouping of the accessories, and provided with compressor and reducing gear.

Cylinder dimensions are 146 by 165 mm. The steel cylinders have screwed-in aluminum alloy heads, the cooling fins of which are laid out in such a way as to be equally effective whether the engine is used on tractors or pushers. The pushrods are inside tubes and the valve gear is enclosed by quick detachable aluminum covers. A centrifugal blower is driven off the rear of the crankshaft, through elastically mounted pinions, at either three or ten times engine speed, the former ratio being to give a mixing effect, and the latter to supercharge. All the accessories are very conveniently mounted on the rear plate and comprise two R.B. magnetos, double gasoline pump, oil pump and easily dismountable filter, electric starter, revolution counter and machine-gun synchronizer. The reducing gear is the



Rene Couzinet monoplane with three 40 hp. radial engines and collapsible landing gear + + + + +



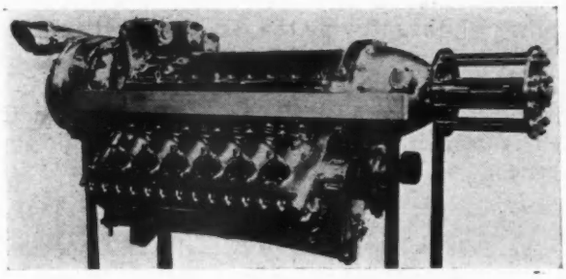
Method of pumping oil to cam by means of valve plunger in Lorraine engine + +

Farman type. Nominal power output is 300 at 1950 r.p.m., or 370 hp. when supercharged, with a total weight of 627 lb.

A year ago Farman produced an inverted water-cooled engine with 18 cylinders. Now two other models have been added, of the same general design, but with respectively 12 and 8 cylinders. Each bank of cylinders—4, 6 or 8, according to the engine—is a single Alpax casting, steel lined. All are fitted with the Rateau supercharge and the Farman reducing gear.

A new 18-cylinder W water-cooled engine developing 700 hp. is shown by Lorraine-Dietrich. The cylinders are of steel, with screwed-in aluminum alloy heads, and a welded jacket. There are four vertical valves per cylinder, operated from a single camshaft, with a T-shaped tappet for a pair of valves, so that no side thrust is transmitted to the valve stem guides. A patented feature of the valve gear is the use of the vertical member of the valve tappet as an oil pump delivering lubricant under pressure to the face of the cam. This engine is fitted with a Stromberg carburetor per group of two cylinders. A planetary type reducing gear, with six satellites, gives a reduction of 11 to 17, or 1294 propeller r.p.m. for an engine speed of 2000 r.p.m.

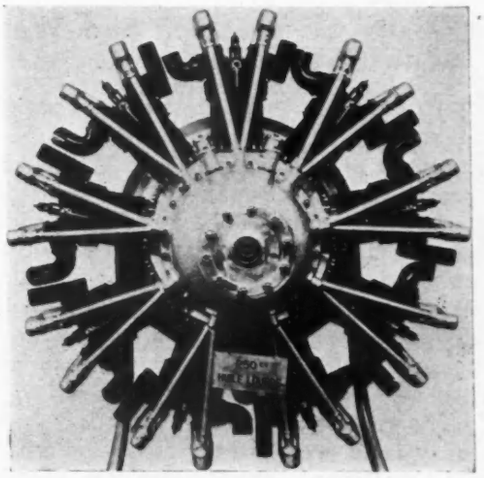
With a bore and stroke of 125 by 180 mm. and a volumetric compression ratio of 6, the engine weighs 1252 lb. without accessories. Nominally rated at 700, its effective horsepower is 840, with 900 hp. at 2400 r.p.m. This is the highest power made in one unit in France.



Farman 18-cylinder inverted supercharger engine + + + + +

Another high-powered engine is the Renault 18-cylinder W, of 750-850 hp., with cylinders of 125 by 170 mm. It has four valves in the head operated by a single overhead camshaft, driven by bevel from the rear, and is equipped with a blower forcing the mixture through three straight intake manifolds. Two horizontal carburetors are used. The engine has a centrifugal oil purifier, two magnetos placed just in front of the blower, and water pump and two gasoline pumps at the base of this rear assembly. The propeller is geared down through straight pinions, giving 1130 r.p.m. for a crankshaft speed of 2100. At this engine speed the power output is 850. The total weight is given as 1386 lb.

Multi-engine, all-metal monoplanes are an outstanding feature of the show. Most important of these is the Junkers G. 38 with four engines mounted inside the wings. Owing to its size this is shown



Lorraine-Dietrich nine-cylinder radial heavy oil engine + + +

only in model form, the firm contenting itself with the Junkers Junior, a single-float flying boat built entirely of metal, including wing covering. The Dornier DO-X flying boat, equipped with four Hispano-Suiza engines of 600 hp. each, is shown completely fitted up.

Another big machine is the Liore & Olivier OH 27 hydroplane, the hull of which is the only part shown. This is intended for trans-Atlantic service and will be equipped with four engines in tandem, in pairs, and is designed to carry ten passengers distances of 600 miles. It has a wing spread of 122 ft., a length of 70 ft., weighs 17 tons and has a commercial speed of 120 m.p.h.

Caudron has an all-metal cantilever monoplane with a central fuselage below the wing and three Lorraine-Dietrich radial engines, the two lateral engines having their fairings merging into the leading edge of the wing. A similar type is the Potez 40 three-engined monoplane, with one engine in the nose and the two others—Salmson radials of 240 hp. each—on the front strut, with their fairings tapering back to the rear strut. This is an all-metal construction, including wing covering.

The all-metal Wibault is a low-wing cantilever monoplane, with a fuselage having a framework of duraluminum built up in three sections. One engine is in the nose; the pilot's cabin is in the upper part of the fuselage in front of the leading edge. The two other engines are to left and right of the cabin fuselage on the struts. The engines are three 300 hp. Titan Gnome & Rhone. Vickers Ltd. have secured the English rights for this contruction. Too big to be brought into the hall, the Nieuport Delage DB 70 is shown in model form. It is a three-engined, thick-wing monoplane with two fuselages united by the wings, the central portion of which forms both a cabin and an engine room. The S.P.C.A. has a three-engined monoplane with the usual mounting of one engine in the nose and the two others just below the wings. It is all-metal, including wing covering and propellers. Rene Couzinet has a low-wing monoplane with three radial Salmson engines of only 40 hp. each. One engine is in the pointed nose of the machine and the two others are in sharply pointed nacelles let into the entering edge of the wing. The landing carriage is collapsible, the wings being hinged outwards until they enter into recesses on the underside of the lateral engine nacelles.

Bleriot has a twin fuselage monoplane of rather unusual design driven by two Hispano-Suiza engines placed in tandem on the center line of the wing, between the fuselages. Accommodation is provided for six passengers in each fuselage, entrance being through a door on the outside, with access from each fuselage through the wing into the control cabin between the engines. There is a landing carriage with wheels in tandem under each fuselage. Total weight of the machine is 7 tons. Parts are shown of the Model 5190 four-engined plane developing 2400 hp., designed to carry 20 passengers and having a weight of 20 tons.

One of the structural features of the show is the Breguet box-type steel frame forming a cross. The fuselage, which comprises a detachable engine mounting and the cockpits, is carried on the longitudinal member of the cross, while the transverse members take the flying and landing loads. It is really the main spar of the short lower wings and receives at its outer ends V struts joined to the upper wings. A portion of the main box section corrugated limb is left bare between the fuselage and the tail, thus leaving the tail apparently sticking up in the open. This is done to give a better field of fire for the gunner at the rear of the fuselage. This, however, is a detail, the real interest in the machine centering around its high tensile-steel framework.

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# For the Business Bookshelf

## Oil—Its Conservation and Waste

Fourth edition, by James H. Westcott, LL.B. Published by Beacon Publishing Co., New York, N. Y.

THIS is a work dealing with the economic aspects of the petroleum industry. The various improvements in processes introduced by the oil industry to produce larger amounts of the particular fractions for which there was the largest demand at the time are discussed from the standpoint of their effects on the conservation of our petroleum resources. Several of the more important cracking processes are described, and a chapter is devoted to litigation in connection with cracking-process patents and licenses granted thereunder.

The greatest problem confronting the oil industry today is to prevent overproduction with its accompanying waste. Overproduction is encouraged by the possibility of drawing oil from lands adjacent to a lease, which leads to intensive drilling throughout the field whenever a new field is discovered. The situation evidently can be remedied in two ways—either by voluntary cooperation of the operators or by government control. But cooperation between the operators with a view to restricting development in the past has been considered as contrary to the anti-trust laws. It appears that the government is changing its attitude in this respect and Mr. Westcott points out that a most important step in the conservation of petroleum was taken by Congress in July last when it passed a bill amending the Federal Leasing Act in such a way as to permit "unit operation" of leases to Federal lands. This change in the "leasing act" will remain in effect until Jan. 31, 1931, by which time a permanent law of the same purport is expected to have been placed on the books. The author expresses the view, based upon many years' study of the oil industry, the oil companies and the work of their executives and employees, that cooperation is desired and will be carried out if permitted. If it should fail through the selfishness of certain operators, it would then still be time for legal measures. "They might require constitutional amendments declaring oil a public utility——."

# Just Among Ourselves

## And More to Follow

HERE'S to wish you a very Happy New Year. May your sales increase, your costs be lowered, your profits go up and your golf score go down. And may you have courage to fight on with a cheerful vigor if none of these things happen quickly of their own accord.

Happy New Years can be wished on us—prosperous ones we must make for ourselves. Selah.

## That Closed Territory Bogie

THE argument about closed territories for automobile dealers is going to be near the top of the heap in the manufacturer-dealer relations as 1931 gets under way. A number of factory contracts as now written give the dealer exclusive selling rights in a certain fixed area—a good many others do not. Some of those which do are enforced more strictly than others.

Any factory sales manager who has tried to operate a closed territory arrangement for dealers with consistency and vigor will tell you in his confidential moments that, from a petty trouble standpoint, it's a pain in the neck. "We used to have a closed territory arrangement in our contract," one chief sales executive told us recently, for example, "and now we haven't. My! what a relief that change has been to me personally; I used to spend several hours every day in correspondence and argument about infringements. Now I work at trying to sell automobiles."

## And the Banker Says—

THERE is no doubt at all about the practical difficulties of operating and enforcing a closed territory arrangement from the standpoint of the factory. It's our impression that these very real difficulties are largely responsible for such factory opposition as exists to the closed territory idea, particularly in the middle and high-priced groups. Some feeling probably does exist that total sales might be curtailed by such an arrangement, but we don't believe that to be the dominant element in factory attitude on the subject at the moment.

Fundamentally there is much to be said for the closed territory arrangement from the standpoint of the dealer. When a man wants to go into the automobile business he asks his bank for some money. The banker looks at the dealer contract to see what elements of stability it insures. He finds, among other things, that this man who is asking him for money to go into business with can have his contract canceled without cause on short notice and frequently that he has no protection against selling effort in his area by other dealers for the same make nor against the placing of another dealer for the same make in close proximity.

Not all bankers are unfavorable to automotive accounts, but few of them base their favorable attitude on the stability features of the contract. Many who are unfavorable do rest their unfavorable opinion largely on that basis.

## It's Business That's Needed

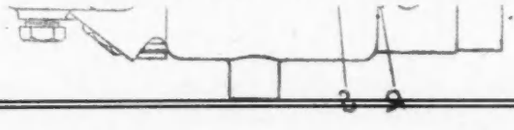
"INSURED STABILITY" for the reasonably effective dealer is far easier to talk about than to achieve even with the best intentions on the part of a factory. It's a good bit easier to prove why that state can't be approached more closely than to show how it can be.

But the merchandising of automobiles and parts and service at retail is a business—not an argument. Too many evidences exist of the manufacturing branch of the industry having won arguments and lost the retail outlets.

## The Real Issue Is—

THE real question that faces the industry is not whether the dealer or the factory is more just in opinions. The question is, "How can retail outlets be made more stable and more consistently able to move the products of the industry year in and year out?"

Certainly the automobile dealer must be provided with greater basic stability in the future than in the past. The fundamental should not be obscured in mutual recriminations. We predict that this greater stability will involve a better break for the dealer in the contract itself and at least one more year of production definitely held in check to permit further reduction of excessive used car stocks.—N.G.S.



# Wheeler-Schebler Develops Carburetor

## The accelerating device is of the dwell type continuing to discharge for a definite length of time

THE Wheeler-Schebler Carburetor Co., Indianapolis, Ind., has developed a new Model T carburetor in a 1½-in. size which is an improvement on the Model T made in 1930. Several drawings of the new model are shown herewith.

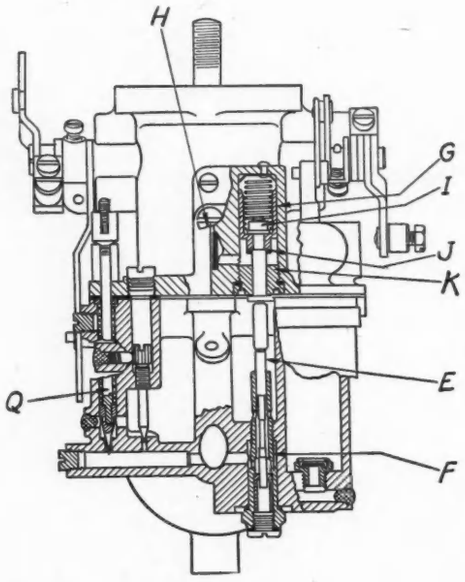
The body castings are made of cast iron, with a parkerized and stained finish. Metering parts, the accelerating device, etc., are made of yellow brass, and the outside levers, links, etc., are made of stamped steel and heavily cadmium-plated. All bearings, and particularly those of the throttle shaft, choke shaft and float arm, are made of liberal size for long life.

This carburetor has a fixed venturi *A* and a main nozzle *B* from which the metered fuel is discharged into the air stream passing up the venturi. When set for idling, the metered fuel is drawn up the idling tube *C* and discharged into the throttle barrel in the idling hole above the closed throttle disk. As the throttle disk *D* is opened, metered fuel is discharged from the lower idling hole in addition to that from the upper hole, and as the throttle disk is opened still farther, the main nozzle delivers additional fuel. The main nozzle is air-bled and the proper sizing of the air - bleed passageways, idling passageways, venturi, etc., determines the mixture and pressure - drop characteristics.

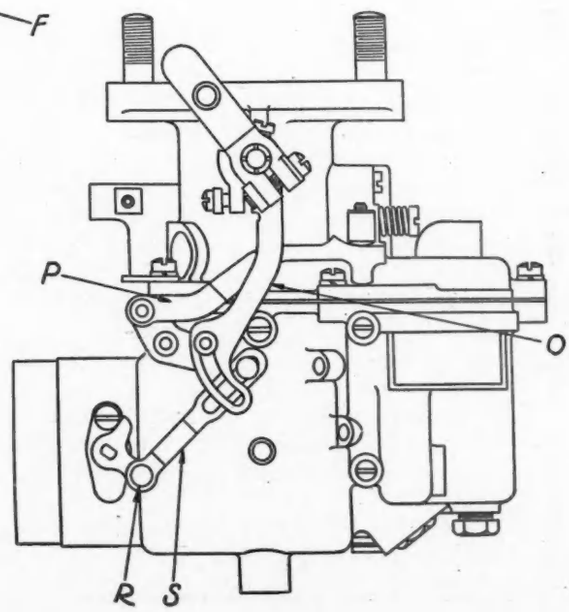
Metering of the fuel delivered by the main nozzle is controlled by the metering pin *E* and metering-pin orifice *F*, the metering pin in turn being operated by a suction-controlled metering-pin piston *G*. The metering pin has a two-diameter portion, one being of the proper size for controlling the economy mixture and the other for controlling the power mixture. Piston *G* is actuated by a spring, and the suction above the throttle (there being a hole from the top of the cylinder into the throttle barrel) in such a manner that when the engine is lightly loaded and the manifold suction is high, piston *G* is lifted and the metering pin is held in the "economy" position. When the load on the engine is increased and the suction in the manifold decreases, the piston drops (and with it the metering pin) to the "power" position.

The advantage claimed for suction-controlled metering over metering under direct throttle control is that it makes it possible to employ a leaner "economy" mixture, while at the same time it enables better part-throttle performance and gives freedom from low-speed tip in lean spots.

A suction-controlled device as described in the foregoing requires a number of safety features to make it stable in operation. In this carburetor the actuating piston is made of yellow brass and works in a smooth, inserted brass cylinder. The lower end of the cylinder is vented into the lower part of the throttle barrel with a screen *H* in the vent to prevent dirt particles from entering and sticking the piston. As there is air leakage past the piston,




Above — Sectioned view showing arrangement of main nozzle with metering pin and of warming-up valve + +




Right — General view of Schebler Model T carburetor, showing interconnection between throttle, choke and warming-up valve + + +

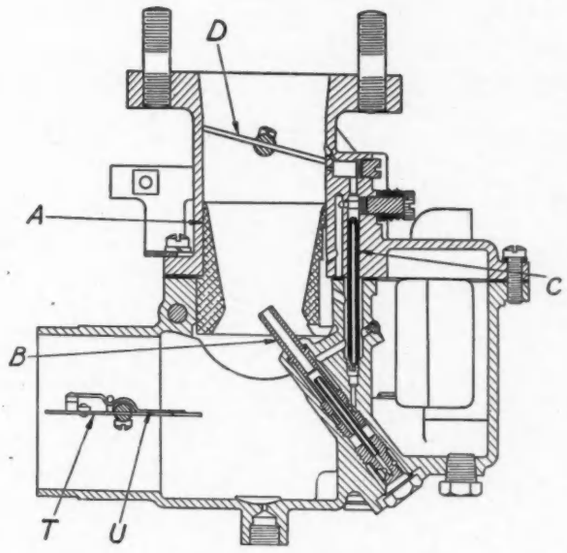
# With New Metering Principle

particularly when the latter is held up by high suction, this air must be clean. The screen is so made that no dirt particles can pass through it and into the cylinder.

To prevent fuel which is splashed around in the bowl from working into the suction-controlled cylinder and thence into the throttle barrel, two gaskets are employed, *I* and *J*, above and below the nut *K* respectively. When the piston is up, the lower gasket seals the cylinder from the bowl, while when it is down, the upper gasket forms the seal.

The accelerating device is of the dwell type; that is, when the throttle is opened an accelerating charge is forced out of the tube *L*, and when the throttle-opening motion stops, the accelerating device continues to discharge for a definite length of time. The advantage of this type is particularly noticeable at low speeds, when more than just a rapid accelerating charge is sometimes needed.

The dash control lever is mounted on a cross-shaft instead of on the choke shaft, as in most plain tube carburetors. This method is used for better control during the warming-up period. The dash control can be pulled out a considerable distance before the choke disk itself is moved to close, and during this initial motion of the dash control the throttle is opened slightly by lever *O* and the mixture is enriched by the warming-up lever *P* lifting the warming-up needle *Q* and supplying extra fuel from the bowl to the main jet.




Vertical section through venturi and air inlet + + + + + + +

When the dash control is moved beyond the warming-up range, the pin *R* engages with the connecting link *S* which closes the choke disk. This choke disk *T* carries a spring-loaded flapper valve *U* which covers a calibrated hole in the choke disk and which releases when the engine starts with a fully closed choke.

The advantages claimed for this starting and warming-up system are easy starting (the engine will continue to run a short time even with a fully closed choke), ability to keep the engine running without fussy handling of the dash control immediately after a start, and smooth handling of the dash control during the warming-up period.

The dash-control throttle-opening device can be calibrated to give slightly higher idling speeds during the warming-up period when higher speeds are desirable on account of cold engines and the proper throttle opening for the actual start with choke fully closed.

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# Effect of Side Wind on Velocity

IN *The Engineer* of Nov. 21, C. F. Dendy Marshall points out that, contrary to the general belief, the increase in the resistance to the motion of a train caused by a heavy side wind is not due to increased pressure of the wheel flanges against the rails but to the angular direction of the resultant of the velocity of the wind and the train, or what is known, in aeronautics as the "relative wind."

The magnitude of the resultant wind velocity is a matter of simple trigonometry and can be found from the equation

$$X = V\sqrt{u^2 + 2u\cos a + 1}$$

where $X$ is the resultant; $V$, the speed of the train; $u$, the ratio of wind speed to train speed; and $a$, the angle of the wind. The angle of the relative wind is given by

$$\tan\theta = \frac{U\sin a}{u\cos a + 1}$$

For $u = 1.75$ and $a = 90$ deg.

$\tan\theta = 1.75$ and $\theta = 60\frac{1}{4}$ deg.

If the train were traveling at 80 m.p.h. in a calm and its cross-section were 100 sq. ft. the amount of the air displaced by its motion would be 11,700 cu. ft. p. s., which is about 944 lb. But by going at 40 m.p.h. with a 70-mile wind at right angles we are doing what is equivalent to pushing the train through still air at 80 m.p.h. at an angle of 60 deg. to its center line.

The virtual area, if the train is 500 ft. long and 9 ft. high, is 4500 × sin 60 deg. = 3897 sq. ft., and the amount of air actually encountered is 3897 × 117 = 455,949 cu. ft. per second, or 36,808 lb., which is more than 18 tons.

The same reasoning applies to automobiles, except that, the automobile being so much shorter than the train, the effect is less pronounced.

# New Relay Truck Has Carload Capacity

## Powered by two engines generating 275 hp. and having a displacement of 420 cu. in.

RELAY MOTORS CORP., Lima, Ohio, in presenting their new Model 300A as the most powerful truck on the market pioneer the field of two-engine, dual-drive, heavy-duty six-wheelers. This new truck, which is designed to carry heavy loads at high speed and to pull one or more trailers, is powered by two separate eight-cylinder engines, each of which drives one of the two Relay type rear axles. The total power available, 275 hp. at 2800 r.p.m., is so great that one engine may be cut out of action when the truck is running empty.

Power steering, by Vickers hydraulic booster, is but one of many power controls incorporated in the vehicle. In fact, in ordinary operation the only control which the driver works directly is the accelerator. Clutches on both engines are actuated simultaneously by a hydraulic cylinder, gear shifting is by compressed air, service brakes likewise operate by air pressure and vacuum boosters apply the two disk type hand brakes on the propeller shafts.

The two engines are mounted side by side in the frame, which is built up at the front to accommodate the dual powerplants. Engines are the new Lycoming AEC type with bore and stroke of 3¾ by 4¾ in., giving piston displacement of 420 cu. in. and developing maximum torque of 305 lb.-ft., at 1200 r.p.m. Each engine is a complete unit in itself, incorporating not only the accessories for its own operation but in addition the oil pump and air compressor required for power controls of the vehicle.

Mounted in unit with each engine is a Fuller VUOG transmission providing five forward speeds and two reverse speeds. Fifth speed is an overdrive, fourth speed being direct. Gear shifting of both transmissions together or either one separately is accomplished by separate air controls of Universal Gear Shift Corp. pattern on top of each case operated by compressed air. The control lever is placed beneath the steering wheel and actual shifting is brought about by depressing the clutch pedal all the way. A separate control placed on the dash cuts out either one or the other of the transmission controls when the vehicle is running on only one engine.

Two propeller shafts are carried back to the rear axles, the left engine driving the rear axle and the right engine the center axle. To accommodate the displacement of the shafts from the conventional position at the center line of the frame the axle housings are offset. Although one is placed to the right and the other to the left the axles actually are identical, one being mounted upside down.

Each rear axle is equipped with two radius rods and a torque rod. This construction leaves the springs free of driving and braking stresses and it also keeps the angles of universal joints within known limits. An interesting feature of the design is the fact that the propeller shaft for the rear axle embodies a short section which is rigidly attached to the top of the center axle.

Two semi-elliptic rear springs are used on each side. Each spring is rigidly attached to an axle housing and is shackled at each end. A rocker arm is mounted between ends of the two springs on each side and ends of the arm are attached to ends of the springs by long shackles. This type of assembly provides for relative movement of the spring ends when going over uneven ground. Front end of the forward spring and rear end of the rear spring are attached to frame brackets by means of shackles. Springs measure 54 by 4 in. and have 10 leaves. Rear axles, which embody the well-known Relay pendulum type of drive, do not have dead axles outside the housing nor cross shafts within the housings. Each of the four rear wheels is free to oscillate independently within limits imposed by rubber stops. Steel wheels, 22 or 24-in. base, and dual balloon tires are standard for rear axles.

### Specifications

**Engines**

| | |
|---|---|
| Number | 2 |
| Make | Lycoming |
| Model | AEC |
| Cylinders | 8 |
| Size | 3¾ by 4¾ in. |
| Displacement | 420 cu. in. |
| Hp. both engines | 275 |

**Clutches**

| | |
|---|---|
| Number | 2 |
| Make | Jones |
| Type | Twin Disk |
| Operation | Hydraulic |

**Transmissions**

| | |
|---|---|
| Number | 2 |
| Make | Fuller |
| Model | VUOG |
| Speeds | 5 forward<br>2 reverse |
| Direct in | 4th |
| Control | Air |

**Steering**

| | |
|---|---|
| Type | Roller |
| Operation | Hand with hydraulic booster |

**Rear Axles**

| | |
|---|---|
| Number | 2 |
| Make | Relay |
| Type | Pendulum |
| Drive | Separate |

**Tires**

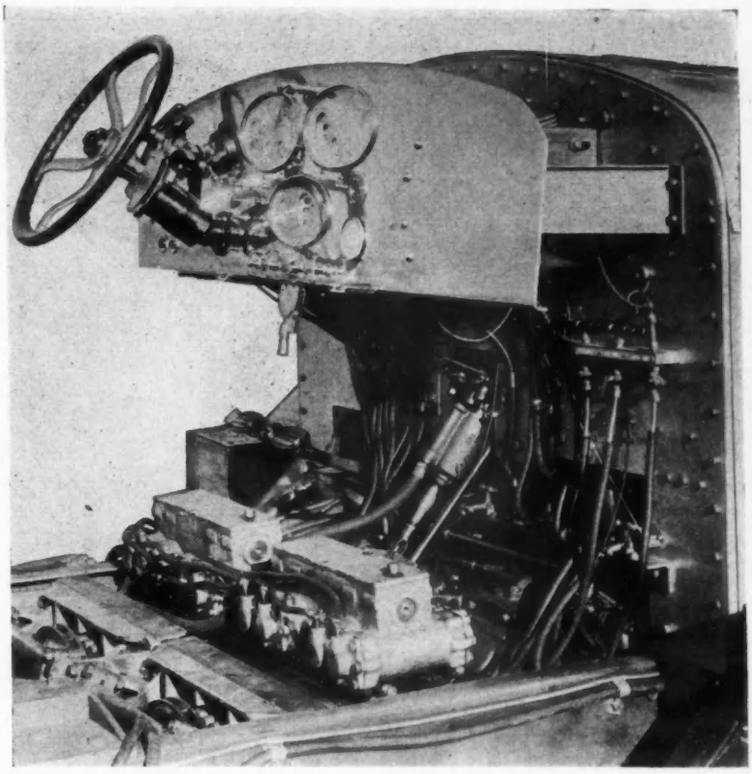
| | |
|---|---|
| Type | Balloon<br>Single front<br>Dual rear |

**Brakes**

| | |
|---|---|
| Service | 6-wheel |
| Make | Westinghouse Air |
| Lining | American Blocks |

# at High Speeds

by James W. Cottrell



Clutches on both engines are actuated simultaneously by a hydraulic cylinder and gears are shifted by compressed air + + + + + + + + + + +

Front springs, which measure 50 by 3½ in. with 12 leaves, are bracketed at the rear and are attached at the front to Mogul model Cleco Gruss Air Springs

Service brakes operate on all six wheels and are of Westinghouse type with American molded brake blocks. The air compressors with a capacity of 12 cu. ft. per min. at 1200 r.p.m. develop pressure of 100 lb. per sq. in. in five tanks having a total capacity of 4225 cu. in. Hand brakes are of the two-shoe Rosenberg type and, as previously stated, are actuated by vacuum booster.

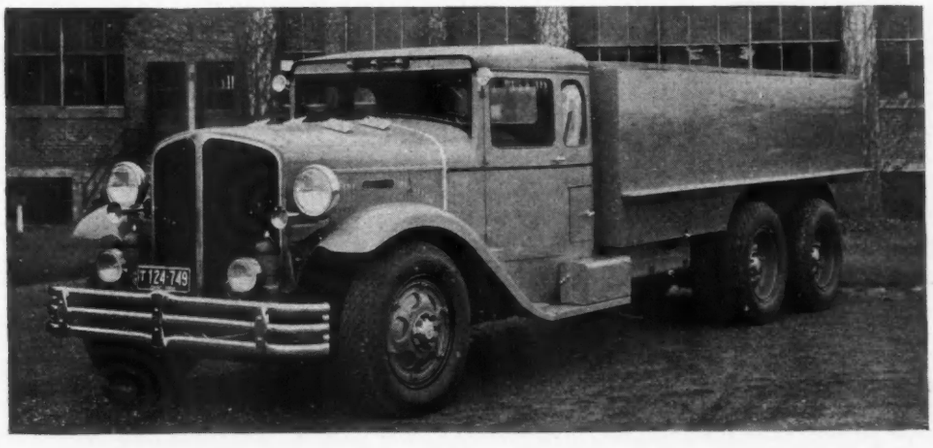
The frame, which has a width of 34 in. from the rear to the cab, embodies side rails 10 in. deep, with flanges 3½ in. wide, all of ⅜-in. stock. It is reinforced by 18-in. fish-plates.

Three gasoline tanks with a total capacity of 150 gal. are carried. Two are placed, one on each side, just outside the frame and the third under the driver's compartment.

Width of hood, front compartment and cowl give room for a spacious cab. It is of the coupe type with a belt line extending into the hood. Three individual seats are provided for driver and helpers and a full-length berth is placed crosswise at the rear below the top of seat backs.

Despite the fact that Model 300A is a heavy-duty vehicle the designers did not overlook the advantages of saving in weight of chassis. In addition to careful attention to engineering design to avoid needless weight they have incorporated strong alloys of aluminum in many parts. Much of the front frame section where the engines are mounted is of aluminum alloy, and this material also is used in the rear spring rocker arms, spring brackets and radiator shell.

The new truck recently completed a run from the Lima plant to Los Angeles, a distance of 2605 miles, with total gross load of approximately 36,000 lb. According to report by wire from Los Angeles to the factory the trip was completed in 94¾ hours driving time, an average of about 28 m.p.h.



Much of the front frame section is of aluminum alloy. This material is also used in rear spring rocker arms + + + +

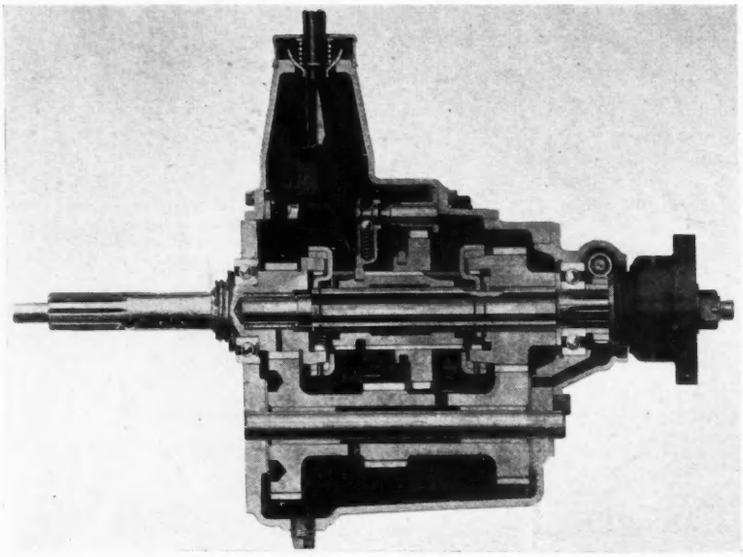


Fig. 1—Section of the helical gear synchromesh transmission offered by Muncie Products Division, General Motors Corp. + + + + + + + + + + +

# Synchromesh A New Muncie

A NEW synchromesh transmission combining helical gears for quiet second speed operation with a cone clutch synchronizing action for the engagement of direct and second speeds is now being offered to the trade by Muncie Products Division of General Motors Corp. It is found on the 1931 Oakland eights and Oldsmobile sixes.

A section of this transmission, Fig. 1, shows that the two pairs of constant mesh helical gears for countershaft drive and for second speed are located at the two ends of the transmission with the synchronizing mechanism and low and reverse gear engagements located between them. This mounting of the constant-mesh gears results in less overhang and therefore lessened deflection of the transmission shafts. The mainshaft is carried on ball bearings with a roller pilot, and the countershaft on long bronze bushings with thrust plates at both ends, between the countershaft cluster gear and the transmission case.

Synchronization of the transmission driving pinion with the splined driven shaft for silent engagement depends, as in other synchromesh transmissions, on the action of a bronze friction clutch engaging a cone integral with the gear and is actuated by a set of "servo" cam surfaces on the sliding member.

The action is best described by reference to the accompanying illustrations. Let us assume a car speed of 35 m.p.h., with the transmission driving pinion turning at 1875 r.p.m. and the second speed gear (in constant mesh) turning at 1150 r.p.m., the transmission being in "high." Suppose it is desired to shift down into second. After the clutch has been disengaged, the sliding member, splined to the mainshaft (see Fig. 1), leaves the driving pinion and approaches the second speed cone clutch drum (Fig. 2, center), forcing this drum on to the cone of the second speed gear (Fig. 2, upper right). The drum is being driven by three arms carried in the transmission mainshaft splines at 1875 r.p.m., and the second speed has to be brought up to this speed, along with the countershaft, the countershaft drive gears and the clutch plate. Since the average time required for this change in speed must be kept down, the acceleration obviously requires more force than the manufacturers consider desirable to supply by the driver through the gear shift lever or a series of springs. This energy in the transmission in question is supplied by a servo cam mechanism regulating the pressure on the cone to bring the gear up to speed.

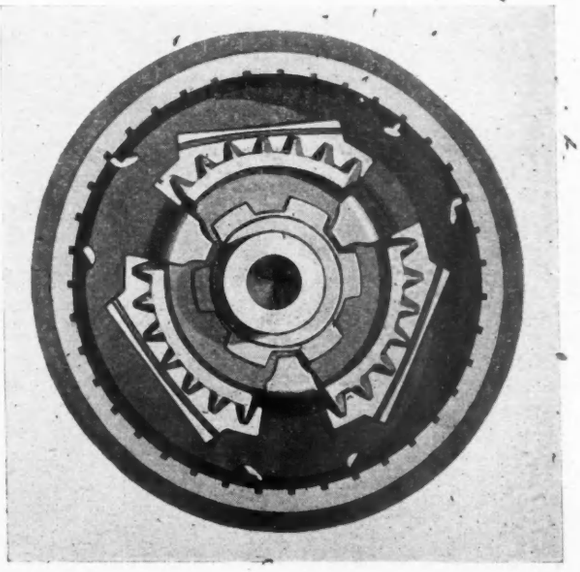


Fig. 3—End view of the transmission mainshaft, showing how the synchronizing drum can rotate slightly under pressure so that the servo cam action can take place. The "detent" wires, which assure correct positioning of the inclined faces as soon as the initial contact between the cone clutch faces is made, are shown here + + + + + +

# Transmission Development

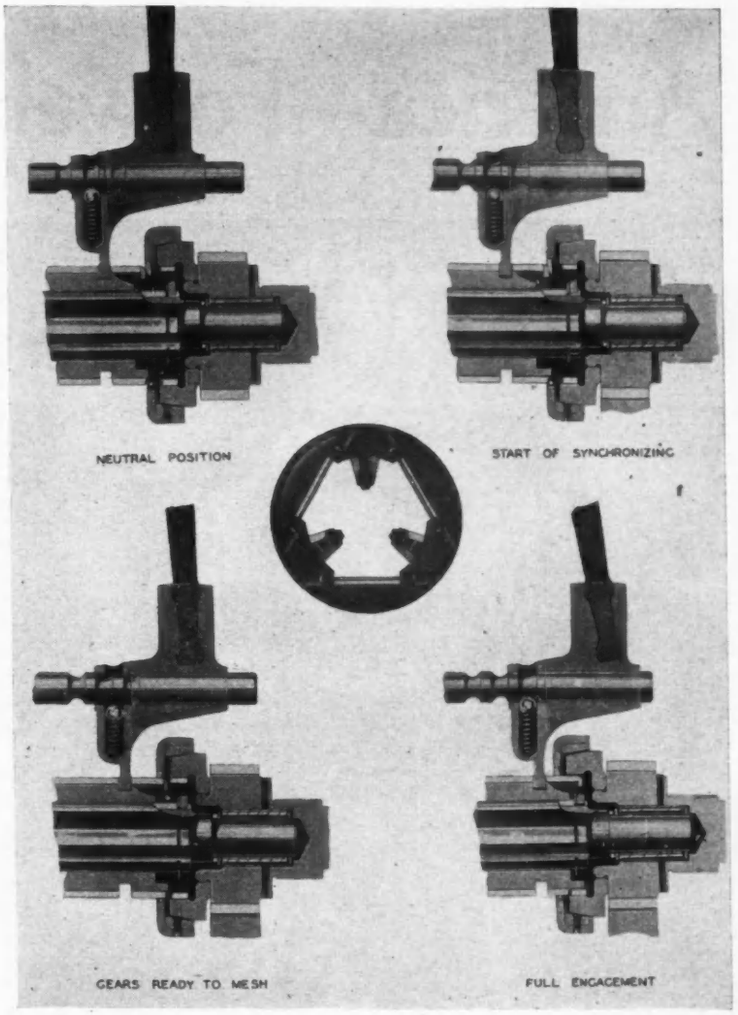



**Fig. 2—Showing how the synchronizing action is accomplished. The back side view of the cone clutch drum, shown in the center, indicates the location of the angular faces which control the cone clutch pressure. These inclined faces are virtually servo cams + + + + +**

Ths servo cam is in the form of inclined faces on the arms of the drum (Fig. 2, center). Inclined faces on the ends of the sliding members contact these inclined faces on the drum. As the second-speed gear is brought up to speed, the pressure between these inclined faces decreases, since the drum no longer tries to turn with the second-speed gear, and around the transmission mainshaft, and the two sets of sliding faces slide past each other. When the edge of the sliding member passes the apex of the angle on the inclined surface of the arms on the drum, the pressure on the drum is released, breaking contact and allowing a slight interval for the teeth of the sliding member to hunt, while these teeth are sliding through between the arms of the drum. Striking "end on" is thereby avoided (Fig. 2, lower left and lower right).

It will be noted that the synchronizer drum carries three "detent wires." When the gears are shifted at low speeds, the angular edge of the sliding member comes in contact with these three wires, and forces the drum onto the cone of the gear. When the drum is in place, the wires spring out and over the sliding member. Contact is then made between the inclined faces of the drum and the sliding member, as described above. In other words, the detent wires are for the purpose of placing the drum of the synchronizer clutch in such a position relative to the sliding member, that the sliding member will hit the angular faces on the arms of the drum and not slide right past it into engagement. Fig. 3, showing an end view of the transmission mainshaft, serves to illustrate this part of the operation, which is made possible, of course, by the side clearance of the synchronizing drum arms in the splines of the transmission mainshaft. Back of these arms (Fig. 3) is an undercut in the splines or teeth of the sliding member, into which the drum backs off when its synchronizing action has been completed.

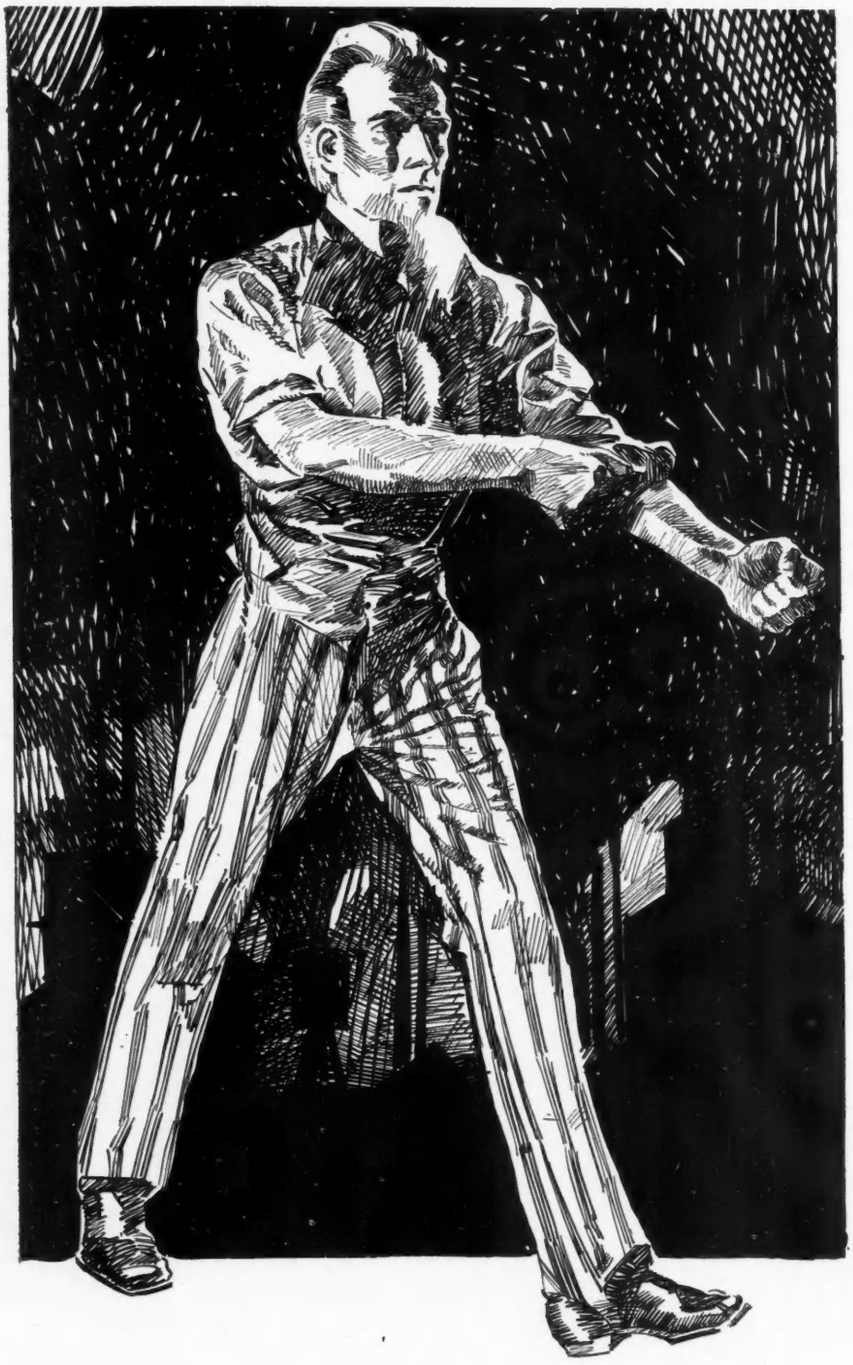
The grooves cut in the bronze liner of the drum are for the purpose of removing any film of lubricant from the cone of the gear to be synchronized, to assure a quick taking hold of the two members of the cone clutch.

Engagement for low and reverse in this transmission is through spur gears, of which the mainshaft sliding member is carried on the outside of the direct and second speed sliding member. For low speed it engages the spur gear centrally machined on the countershaft, and for reverse it engages a spur gear on the reverse idler shaft. The latter is driven from the same central gear on the countershaft (see Fig. 1).

Low gear reduction is 3.06 to 1, with 3.44 to 1 for reverse and 1.63 to 1 for second. A ball plunger under spring pressure in the shift fork locks the fork in either second speed or direct drive position by means of grooves machined in the corresponding cross-shaft.

The clutch drum, when its gear is not in engagement, is held in position endwise on the transmission mainshaft by a snap ring.

# America—Forward March!



## Automotive concerns are increasing schedules for business upswing

CURRENT news reports from manufacturing centers of the automotive industry indicate that many parts and automobile plants will materially increase their operations in the near future.

The industry feels that the end of the depression is near, and that 1931 will be a year of progress.

Auburn has placed orders for supplies and parts totaling $9,000,000.

Chevrolet has inaugurated a nation-wide system of assembly plants for truck bodies as part of that company's program for the employment of 30,000 workers directly and more than 100,000 indirectly.

On Jan. 5, Ford and Cadillac will open their plants on a larger production scale with considerably larger schedules. Ford will open several new assembly plants.

Hudson has added 7500 workers, and the Mullins Mfg. Corp. has 500 more on its payroll than at this time last year.

The Cord Corp. is planning several air lines, offering hourly service at railroad rates.

J. I. Case Co. will complete a large Soviet order, running into the tens of millions of dollars, by Feb. 1.

Jordan will be reorganized with more capital, and the De Vaux and Martin automobile plants will supply new buying sources in the parts and material markets.

Olds Motor Works has recalled several thousand men in the past few weeks.

States of the Union will spend $840,850,000 on construction and maintenance of highways in 1931.

# New Tillotson Carburetor Made In Sizes to Fit Wide Range of Engines

TILLOTSON MANUFACTURING CO., Toledo, Ohio, announces the development of a new Model J carburetor by its engineering research laboratory. This new model is being manufactured in a number of sizes, meeting the requirements of engines of from 30 to 95 hp.

Simplicity of design and compactness are among the advantages claimed for the new model. With the exception of the accelerating pump, which is operated directly by a lever on the throttle shaft, there are no auxiliary moving parts. To reduce wear to the minimum, all wearing parts are sealed against the entrance of dirt, and the throttle shaft is mounted in steel bushings.

The body castings are made of zinc-base die castings, this process insuring uniformity of dimensions and a considerable reduction in the weight of the complete instrument.

The accelerating pump cylinder is retained in the float bowl and is kept filled at all times with gasoline from the bowl. When the throttle is opened, the pump plunger (Fig. 3) is forced down by a lever attached to the throttle shaft. The fuel under the accelerating piston is then forced up through a channel leading up to the pump delivery jet which delivers the accelerating charge into the throat of the carburetor. Any fuel displaced by the piston in excess of that metered out of the pump delivery jet during the stroke of the piston, is forced over to the pump reservoir, from which it flows, by gravity, back to the pump outlet jet, thus causing the pump jet to deliver fuel for some time after the throttle has stopped moving. The duration of the delivery of the accelerating charge is, of course, determined by the characteristics of the engine being carbureted, and therefore must be variable; it is controlled by the length of the standpipe in the pump reservoir. Any fuel forced into the pump reservoir after the level in same is up to the top of the standpipe overflows into the standpipe and returns to the float bowl. Thus the duration of the charge is controlled by varying the length of the standpipe in the reservoir. The metering, or rate of discharge of the accelerating charge, is controlled by the size of orifice in the pump delivery jet.

The power jet fuel restriction (Fig. 3) is supplied with gasoline by means of a channel directly from the float bowl. The power jet outlet, which is located in the throat of the carburetor just above the choke of the venturi, functions only when the throttle is wide open, because of the power jet control valve located in the throttle shaft. In Fig. 3 the throttle is shown in the closed position. A hole drilled in the throttle shaft is directly in line with the channel leading to the power jet outlet. This channel is drilled through the throttle shaft bearing and is open to the atmosphere at a point above the shaft. This keeps the power jet outlet from delivering fuel at partial throttle positions, since there is then atmospheric pressure at the power jet outlet and fuel cannot be lifted to it. As

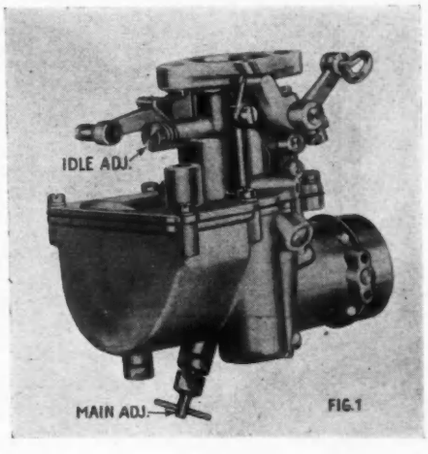
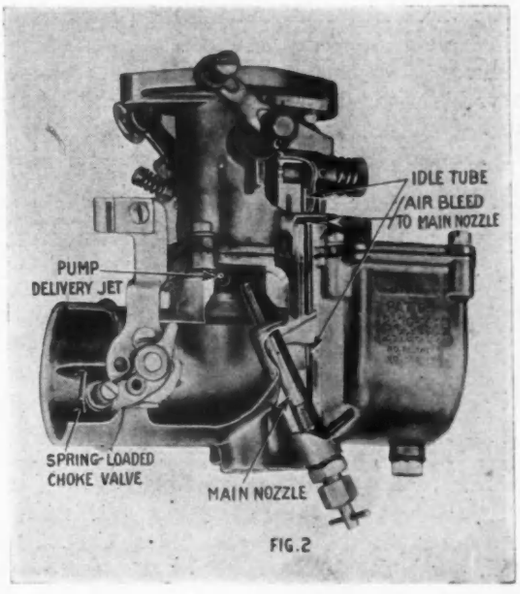



Fig. 1 — New Tillotson Model J carburetor

Fig. 2—Cutaway view of the Tillotson carburetor + + + + + + +



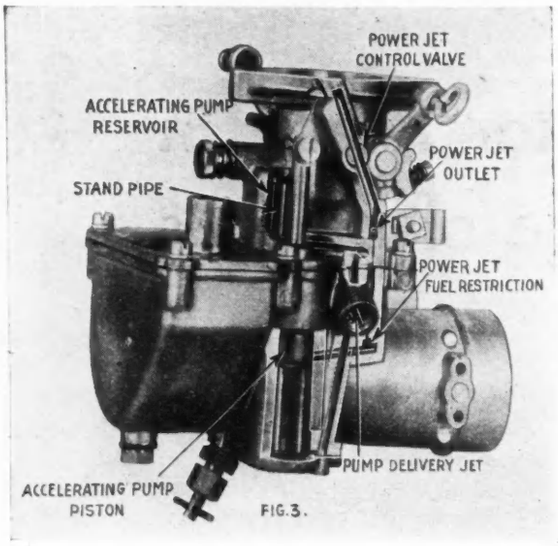



**Fig. 3—Cutaway view of the side opposite to that shown in Fig. 2 + + + + +**

the throttle opens, that section of the channel contained in the throttle shaft is turned out of line with the rest of the channel and completely closes the channel to atmosphere when the throttle is more than seven-eighths open. This allows the power jet outlet to form a vacuum in the channel and thus lift the gasoline from the power jet fuel restriction which meters the fuel required for enrichment at wide-open throttle.

The spring-loaded valve in the choke butterfly (Fig. 2) is said to insure easy starting at all temperatures and to make the choke control very insensitive when used during the warming-up period of the engine. The leanest or most economical mixture ratio that an engine can run on is usually 10 to 15 per cent leaner than the mixture ratio required for maximum horsepower. In the Model J, the power jet, which is only functioning at wide-open throttle, or when power is required, is calibrated to meter the additional 10 to 15 per cent fuel required by the engine for maximum power.

When the throttle is opened from any position, the accelerating pump supplies an additional amount of fuel, thus causing the engine to give a quick response to the throttle.

# Knock Testing With a "Mike"

A KNOCK-TESTING outfit, based on the principles of radio, has been developed and is now in practical use in the research laboratory of the Atlantic Refining Co., which is in charge of Dr. T. G. Delbridge. A microphone is suspended on coiled springs near the test engine and picks up all of the noises produced in the vicinity, converting the sound energy into electrical energy. Electrical vibrations corresponding to all of the ordinary engine noises are then filtered out by what are technically known as "high-pass" filters, and only the vibrations corresponding to the characteristic knocking sound, which have a frequency of about 3000 per second, are allowed to pass on to the vacuum tubes. These electrical vibrations are then magnified several hundred times and the magnified current is passed through a milli-ammeter. The indications of this meter are a measure of the intensity of the knock.

**Radio equipment for testing intensity of engine knock. The microphone is shown supported on a standard adjacent to the magneto of the test engine + + +**

---

ALL of the motor omnibuses in service in Paris by the General Public Transport Co., which controls street car, subway and omnibus traffic, are of the single-deck type, although the horse buses previously used had upper decks. The reasons for preferring the single-deckers are that there are rather steep grades with more or less sharp turns on many of the routes, which call for a low center of gravity, and that stops on most of the routes are very frequent and there is less delay from loading and unloading of passengers with single-deckers.

# HOW'S BUSINESS? GOING TO BE NEXT MONTH!

CHARTED BY UNITED BUSINESS PUBLISHERS, INC.

THIRTY-FOUR ECONOMIC EXPERTS—EDITORS OF BUSINESS PAPERS PUBLISHED BY THE *United Business Publishers, Inc.* —HERE PRESENT A COMBINED OPINION ABOUT THE COURSE OF BUSINESS DURING THE MONTH OF JANUARY. GOVERNMENT AND OTHER RECORDS PROVIDE YOU WITH HISTORY OF RECENT MONTHS. THIS BOARD OF EXPERTS DEALS ONLY WITH THE FUTURE. ITS OPINIONS ARE BASED ON CLOSE CONTACT WITH THE MORE THAN 400,000 SUBSCRIBERS REACHED BY THEIR PUBLICATIONS IN FAR-FLUNG FIELDS OF RETAILING AND INDUSTRY.

Confidence begins to replace fear and indecision. Business sentiment grows more favorable.

Those two great muscles, steel and copper, that parallel and aid in the support of the business backbone, have increased in strength. More of our soiled financial linen has been laundered and, while locally a little unsteadying, has not precipitated a further general liquidation of stocks.

The automotive industry stretches a cordial hand to increased buying by way of the automobile shows, and the great merchandising channels find their inventories exceptionally low.

The consensus of opinion seems to be that we have touched bottom by rolling our wheels along it rather than with a decided thud, and that we are again gathering momentum. Whether we return to Better Business by air or afoot, the return will apparently be steady and well tempered. The nausea of the long fall will counsel prudence in the upturn.

The United Business Publishers, Inc., feel that the course of improvement is best personified by the cadence of marching shoulder to shoulder. The greater interdependence of the present calls for such concerted action.

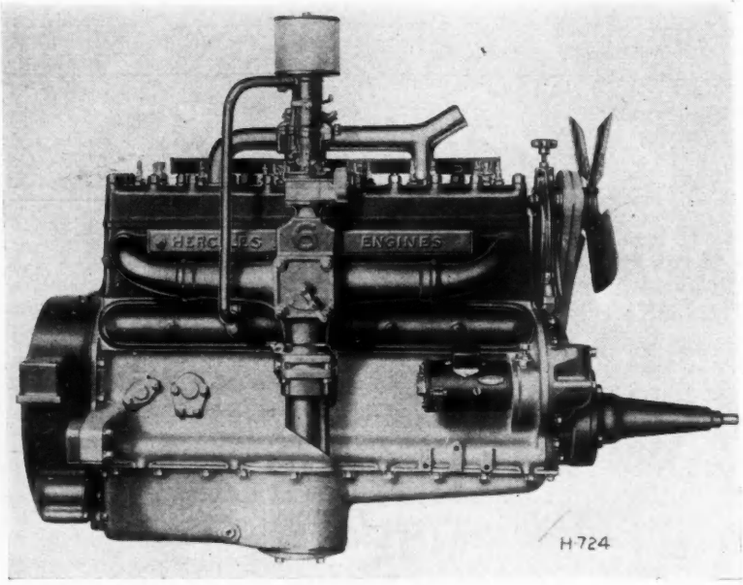
Consequently, we have offered to business the ringing phrase, "1931 AMERICA—FORWARD MARCH," in the belief that business confidence will be further strengthened, and an impulse given to a forward movement. With this phrase as a banner, we propose to give direction and stimulus in the fields which we serve, and to carry this slogan into 250,000 industrial and merchandising establishments, and through our consumer magazines into over 1,000,000 American homes.

**"1931 AMERICA—FORWARD MARCH"**
See Page 944

## THE COURSE OF BUSINESS FORECAST FOR NEXT MONTH

| BUSINESS | SALES | RETAIL STOCKS | COLLECTIONS | COMMENTS |
|---|---|---|---|---|
| AUTOMOTIVE | Anticipated increase of 40% in Jan. over Dec., with decrease of about 30% from Jan. '30 on passenger cars. Trucks 35% and 10% respectively. | Passenger cars slightly higher—trucks about the same in Jan. as in Dec. Trucks slightly less, and passenger cars quarter million less than Jan. '30. | Passenger cars about the same, trucks slower in Jan. than in Dec. Passenger cars somewhat slower and trucks slightly improved over Jan. '30. | Passenger car field grows more optimistic, and, as money loosens up, truck field will improve. |
| DEPARTMENT STORES | Normal seasonal decrease of 50% to 55% from Dec. About equal to Jan. '30. | Normal reduction following holiday selling, and about 10% lower than Jan. '30. | On a par with recent months. | The tendency toward expenditure in usable merchandise will continue through January. |
| HARDWARE | Substantial seasonal decline from December, and about 10% under Jan. '30. | About 10% under Dec., and 25% lower than Jan. '30. | Better than Dec. and slightly slower than Jan. '30. | Recent firming of quotations on several basic lines instilling greater price confidence. |
| INSURANCE | Better in all lines over Dec., and a particular improvement, especially in the cities, in all lines over Jan. '30. | ..... | Collections are hard, and little immediate improvement is anticipated. | The accumulation of contracts deferred until after the first of the year will make a substantial showing. |
| JEWELRY | Normal decrease of 70% to 75% from Dec. Slightly less than Jan. '30. | Retail stocks at lowest point in a long time, much lower than Jan. '30. | Collections, by retailers, better than in Dec.; from retailers, active. Both about the same as Jan. '30. | A better financial position anticipated for the retailer than in past twelve months. |
| LUMBER | About the same as in Dec., and 15% to 20% lower than Jan. '30. | Stocks in Dec. '30 and Jan. '31 at lowest point in several years. 30% under Jan. '30. | Little change. | Price and stock inquiries from railroad and automotive concerns are lending encouragement. |
| MACHINERY<br>METAL PRODUCTS<br>METALS | Some measure of improvement in the iron and steel business seems assured. | Improvement in many metal-working and machinery lines will get under way with more tangible evidence of betterment in business sentiment. | ..... | The low level of recent demand, and extraordinary pressure on inventories, suggest damming up of requirements that must soon be released. |
| PLUMBING AND HEATING | Slight improvement over Dec. (with seasonal allowances), but below Jan. '30. | Retail stocks will continue low. | Slightly better than Dec., and decidedly better than Jan. '30 because of better credit basis. | Stabilization of prices and a restoration of confidence in building industry necessary to give a decided turn for the better. |
| SHOES | Dependent upon weather. Rubber and heavy goods retarded, but should show exceptional business in Jan. General increase of 10% over Jan. '30. | Reduction in stocks universal, about 16% under Jan. '30. | Business 89.5% cash—10.5% credit. Will continue normal. | Orders will be placed for shoes for Easter selling. |

# New Series of Hercules Engines Built




Hercules Series HX six-cylinder heavy-duty automotive engine + + + + + + + + +

**In general design the HX series is strictly a heavy duty line to withstand the stresses of high speed road operation + + +**

AN additional line of heavy-duty, six-cylinder engines of the L-head type is being offered by the Hercules Motors Corp. of Canton, Ohio. This HX series is being produced in five different sizes, as follows:

| Model | Bore | Stroke | Displacement |
|---|---|---|---|
| HXA .... | 4¾ in. | 6 in. | 638 cu. in. |
| HXB .... | 5 in. | 6 in. | 707 cu. in. |
| HXC .... | 5¼ in. | 6 in. | 770 cu. in |
| HXD .... | 5½ in. | 6 in. | 885 cu. in. |
| HXE .... | 5¾ in. | 6 in. | 935 cu. in. |

All engines of this series are identical in general design and in installation dimensions; they differ only with respect to the bore and such dimensions as are affected thereby. In general design the HX series is strictly a heavy-duty line, all sizes being designed to withstand the stresses of high-speed operation.

The crankcase is a separate casting and is supplied either in gray iron or in aluminum alloy, depending upon the service for which the engine is intended. Sixteen "through" bolts are used to secure the cylinder blocks to the crankcase. These bolts are made of S.A.E. No. 3140 steel and are 25¾ in. long. The crankshaft is supported in seven main bearings, each of 3½ in. diameter, the total projected area of the bearings being 58 3/16 sq. in. Connecting rods are of novel design in that the cap bolts are forged integral with the rods. An advantage claimed for this design is that it brings the clamping action closer to the bearing edge than is possible where the rods are drilled and separate bolts used. Besides, the rod is not weakened by the usual drilling and milling for the bolt and head.

Cylinders are cast in two blocks of three each. The heads are removable and so designed as to accommodate two sets of spark plugs, if dual ignition should be desired. Lubrication is by the full-pressure system; a large-capacity, gear-driven oil pump is provided, with a double scavenging pump arrangement which assures proper feed of the oil from the sump even though the engine be inclined to a marked

## Horsepowers Developed by Hercules HX Series Engines at Speeds from 400 to 2000 R.P.M.

| Models | 400 RPM | 600 RPM | 800 RPM | 1000 RPM | 1200 RPM | 1400 RPM | 1600 RPM | 1800 RPM | 2000 RPM |
|---|---|---|---|---|---|---|---|---|---|
| HXA 4¾ x 6″ | 28.2 HP | 45 HP | 60.5 HP | 74.5 HP | 90.5 HP | 105.5 HP | *118 HP | 127.5 HP | 136 HP |
| HXB 5 x 6″ | 31.5 HP | 49.5 HP | 67 HP | 82.5 HP | 99.5 HP | 117 HP | *131 HP | 141 HP | 149.5 HP |
| HXC 5¼ x 6″ | 40 HP | 58 HP | 78 HP | 96 HP | 114 HP | 130 HP | *145 HP | 156 HP | 164 HP |
| HXD 5½ x 6″ | 44.5 HP | 64 HP | 86.5 HP | 107.5 HP | 126 HP | *143.5 HP | 159 HP | | |
| HXE 5¾ x 6″ | 48.5 HP | 73 HP | 96.5 HP | 118 HP | 139.5 HP | *157.5 HP | 175 HP | | |

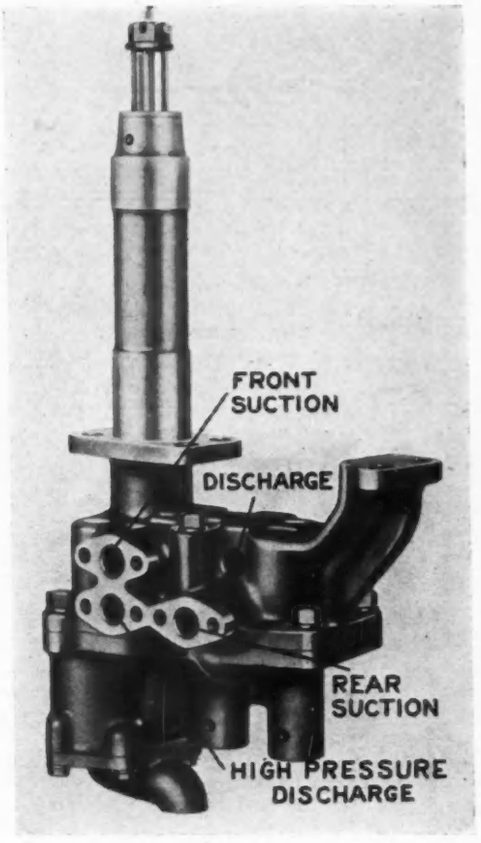
*Maximum Speed for Continuous Service Under Peak Load

# in Five Sizes for Trucks or Busses

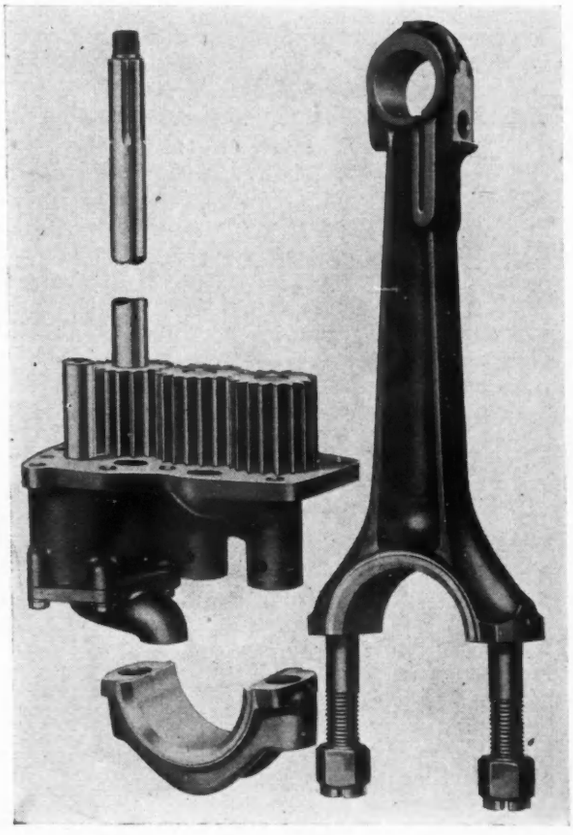
degree. Provision is made for mounting an oil purifier and an air cleaner, and a drive for a fuel pump as well as an auxiliary V-belt drive for a large generator is furnished. The water pump has a capacity of 135 gal. p.m. at 2000 r.p.m., this large rate of flow being considered necessary to assure safe operation at high speeds. The fan is a six-bladed design and is driven by double V belts.

Downdraft manifolds are being offered on the HX series, but updraft manifolds are also available. Exhaust manifolds are of either the center-outlet or rear-outlet type, and in the case of a center-outlet, the discharge may be either upward or downward, to best meet the requirements of the particular installation.

Either three-point or four-point support can be used with these engines, and the customer is offered the choice of S.A.E. Standard bell housings Nos. 00, 0 and 1, while for mounting a starting motor, an




Complete oil pump unit



Double oil pump with part of housing removed. Right—Connecting rod with integral cap bolts + + + + + +

S.A.E. No. 2 flange mounting is provided. The design has been developed to accommodate an air compressor driven from the crankshaft, but it is also possible to install the compressr as a side-mounted unit.

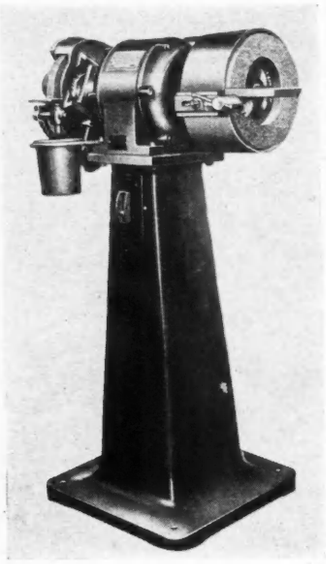
The HX series is adapted for use on motor trucks and buses, as well as for other heavy-duty applications in general industrial, agricultural and oil-field service. Maximum torques range from 410 lb.-ft. for the Model HXA to 610 lb.-ft. for the Model HXE, the torques being substantially constant between 800 and 1200 r.p.m.

Both battery and magneto ignition units can be mounted. The camshaft is supported in eight bearings, all of 2⅜ in. diameter. It is located on the right-hand side when the engine is viewed from the flywheel end. Special attention has been given to proper cooling of the valves, and the valve-stem guides are well cooled. Valves are actuated by mushroom-type lifters of ample proportions.

# NEW DEVELOPMENTS—AUTOMOTIVE

## Black & Decker Grinder for Cemented Tungsten Carbide

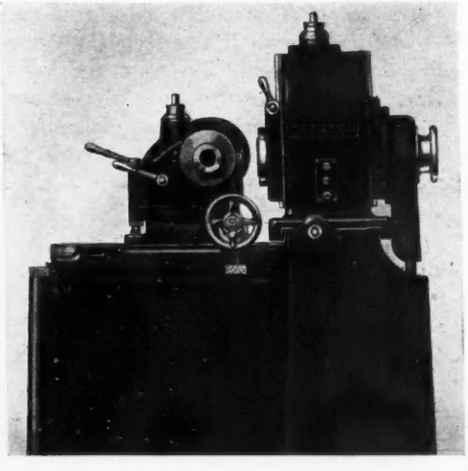
THE Black & Decker Co., Towson, Md., announces the addition of a new 10-in. precision grinder to their line of heavy-duty grinders. This new grinder is designed especially for grinding and resharpening cemented tungsten carbide tipped cutting tools. Tools can be sharpened to the proper recommended angle, accurately and without guesswork. This is said to have been made possible by a special tool rest with a self-contained graduated scale that is fully and precisely adjustable to any position or angle.



This grinder is available in two types: one which accommodates a 10-in. cup-type wheel on the right spindle and a 10-in. straight side wheel on the left spindle and the other type with two 10-in. cup-type wheels, one on each spindle.

## Gleason No. 13 Universal Gear Testing Machine

STRAIGHT and spiral bevels with any shaft angle, hypoids, helical, angular helical, internal, herringbone and spur gears up to 13 in. O. D. can all be tested on the Universal gear testing machine just placed on the market by the Gleason Works, Rochester, N. Y. Gears are tested on this machine by running them together with or without load as desired. The load is applied manually by a brake operating on the driven spindle. The driver or pinion spindle can be operated in either direction. It is mounted in a head which can be adjusted vertically on a column for obtaining the necessary offset of the pinion from the center of the gear. This adjustment is made with a lead screw, while a dial graduated to show 0.001 in. indicates the setting. The column has a horizontal adjustment on the frame for testing angular gears with a long cone distance.

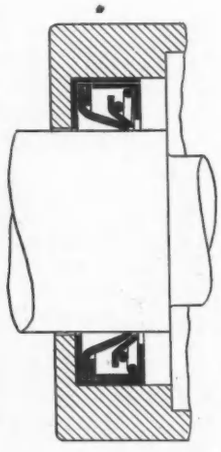


The gear or driver head has three adjustments. The head is mounted on a slide which provides a horizontal adjustment to take care of the mounting distance of the gear. This slide swivels on a base which permits an angular setting from 0 deg. to 180 deg. The base has a horizontal adjustment on the frame to provide for changes in the mounting distance of the pinion. The angular setting can be made to an accuracy of 20 seconds, while the two horizontal adjustments are made by means of lead screws with dials graduated to 0.001 in.

A 3 hp., four-speed motor, 600, 900, 1200 and 1800 r.p.m. with reverse control is used for driving the pinion spindle through a double belt, while two size pulleys give the following possible spindle speeds: 400, 500, 600, 750, 800, 1000, 1200 and 1500 r.p.m. Net weight approximately 3500 lb.

## Gits Precision Oil Seals

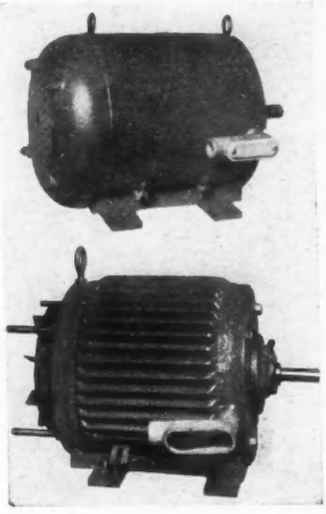
GITS BROS. MFG. CO., Chicago, Ill., manufactures an oil seal for use with ball, roller and plain bearings. The seal is designed to keep the oil in and water, dust and grit out of the bearings. As will be seen from the sectional view, these seals comprise a leather washer assembled with a number of annular steel stampings, the whole forming a unit ready for installation in the bearing housing, a light coiled spring presses a taper washer over the inner end of the leather washer, forcing the latter against the shaft. The seals are said to function equally well on both horizontal and vertical shafts and to produce only little friction. Best results are obtained when the seal is installed with the taper washer (or the side with the largest opening) toward the oil.



# PARTS, ACCESSORIES AND PRODUCTION TOOLS

## Lincoln Totally Inclosed Fan-Cooled Induction Motor

A TOTALLY inclosed, fan-cooled induction motor which embodies some unusual features has been announced by the Lincoln Electric Co., Cleveland, Ohio. Its design includes arc welded steel construction, doubled-sealed ball bearings and a removable cover which facilitates easy cleaning of the large radiating surface.



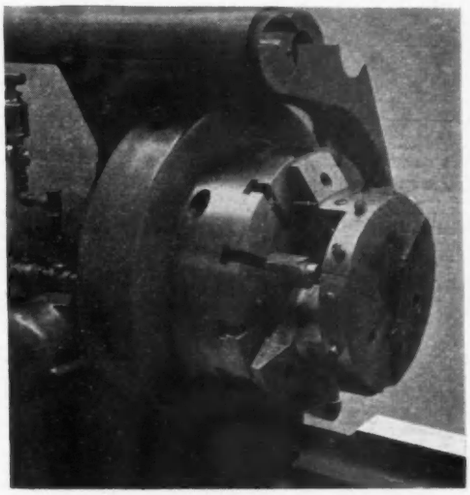
The large radiating surface is obtained by complete inclosure of sides of the motor with a deeply corrugated sheet of corrosion-resisting metal. This conducts the heat created within the motor to its outer radiating surface which is constantly cooled by a continual draft of fresh air.

This new "Linc-Weld" motor has the same mounting dimensions as standard, open type, horizontal motors of equal rating. It is manufactured in sizes from 1 to 50 hp.

## Gisholt Hydraulically Equalized Chuck Jaws

PROBLEMS of chucking parts such as ring gears, or thin walled pieces, without excessive distortion, and of positively gripping rough castings or forgings, have given rise to a new design of chuck jaws on which the Gisholt Machine Co., Madison, Wis., has applied for a patent. These chuck jaws present to the work a group of semi-cushioned surfaces which eliminates the chucking troubles due to uneven surfaces. Further than this, the chucking stresses are evenly distributed over the whole surface, thus minimizing distortion.

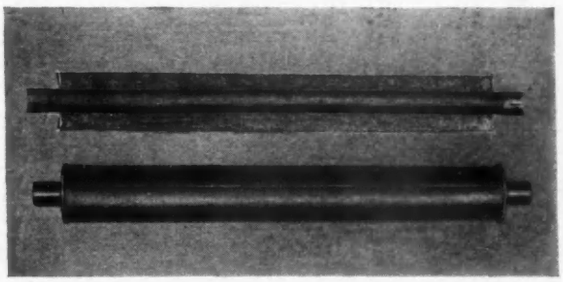
Each jaw contains four pistons free to move in and out through lapped hardened steel liners, providing 12 chucking points to grip a ring gear forging on its inside diameter. These pistons are backed up by a common body of liquid which transmits pressure from one piston to the others. In chucking a rough piece, one of the pistons will probably come on a high spot. This piston will recede into the jaw, forcing some of the liquid behind it into the cylinders behind the other pistons. When all of the pistons have come into



contact with the part being chucked, this cushion effect ceases, since the liquid is practically incompressible. The pressure behind each piston is the same, since the areas of the pistons exposed to the liquid pressure are equal, and since the pressure per square inch in all parts of the body of liquid must be the same.

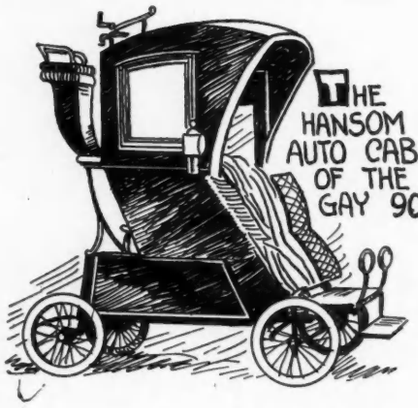
## Burgess Exhaust Muffler

BURGESS BATTERY CO., Madison, Wis., is manufacturing an exhaust muffler of the type in which there is a direct passage through the muffler, so that the back pressure on the



exhaust is reduced to a minimum. The pipe which extends through the muffler has its walls perforated with numerous fine holes and is surrounded by a chamber containing fibrous material produced from lumbermill by-products. When a pressure peak reaches the muffler, some of the gases in the exhaust stream are diverted through the perforations in the wall of the "through" pipe, into the chamber containing the fibrous material, whereby the kinetic energy and the velocity of the stream are reduced, while when the exhaust flow is near its minimum some of the gas that entered the muffler chamber when the flow was at its height, escapes again. The final effect therefore is to even out the rate of escape of gas from the tail pipe, and thus to deaden the noise.

# Automotive Oddities—By Pete Keenan


RANSOM ELI OLDS, IS THE ONLY MAN TO HAVE TWO MAKES OF CARS NAMED AFTER HIM. REO (His initials) and Oldsmobile.

MUNICH, GERMANY, HAS SOLID RUBBER TRAFFIC POSTS.

THE FIRST AMERICAN AUTOMOTIVE PAPER.

# NEWS OF THE INDUSTRY

## Cord Corp. Plans Largest Air Line

### Will Radiate From Chicago to all Parts of United States

CHICAGO, Dec. 22—Formation of a gigantic air transportation system, operating at railroad rates and with Chicago as the hub, was announced Dec. 19 by the aviation group of the Cord Corp. The new air line, it was announced, will be the largest in the world and will operate on a frequent service basis—in many instances, hourly.

Daily schedules of more than 100,000 miles, flying day and night, beginning March 9, are included in the program. Terminal points of the new system will be Chicago, Toledo, Detroit and St. Louis. Lines radiating east, west and south from Chicago will within two years form an air transportation network completely covering the Middle West, the announcement says.

The system will be known as the Century Air Lines, Inc. The project is being financed by the Cord group. No new public financing is contemplated at present. Three important railroads are to become interested in the project at a later date, officials declared. Under the plans, short haul business is to be sought, particularly. Fares in many instances will be the railroad fare, plus Pullman fare. Round-trip rates will be even less. The system, according to Mr. Manning, who is chairman of the Chicago chapter of the National Aeronautic Association, will be made up of at least six units. Contracts are being let for the first unit, one of the largest hangar service stations in the country, to be erected at the municipal airport here.

## Klein Hits Export Practice

PARIS, Dec. 16 (*by mail*)—Dr. Julius Klein, in a recent talk before the member of the American Automotive Club of Europe, strongly stressed the necessity of cultivating goodwill on the European market and scored the policy of, so many executives who, viewing Europe from the home office, withdrew their organization or pared down to a dangerous degree as soon as trade conditions became difficult.

## The News Trailer

By Herbert Hosking

William E. **Metzger** is one of the directors of the **Detroit** Automobile Club for 1930, also Judge **Henry**, president of the **AAA** * * * Jack **Siegfried**, son of v.-p. and g.m. Siegfried of **Motor Wheel**, is captain of the **Culver** Military Academy **football** team * * * **Reo** employees **danced** Dec. 18 for benefit of unemployed * * * Officials of Olds Motor Works and Lansing Oldsmobile Co. had annual Christmas get-together on Dec. 18 * * * Julius **Barnes** will speak at **N.A.C.C.** banquet, Jan. 6, on program with **Cobb** and **Ripley**, previously announced * * * **Chrysler** officials will hold "office hours" during the New York Show on second floor of Chrysler Bld'g in N. Y. * * * Wm. J. B. **Stokes**, rubber manufacturer in Trenton (N. J.), contributed $5,000 to the unemployed * * * 620 **miles** a day for 100 days . . . **Ford** in Germany **didit** * * * James **Schermerhorn**, who will speak at S.A.E. annual dinner, is listed "**official**" humorist . . . what kind is that? * * * D.S.C. means distinguished service club of **General Motors** of Canada . . . dined Dec. 15 at **Windsor** * * * neatest **trick** of the week: Prof. Albert **Einstein** will speak on **Plymouth** radio program from **Berlin**, wk. of Dec. 28 . . . Herr Einstein is in U. S. . . . explain that with **relativity** if you can * * * fewer **Studebakers** are stolen . . . but that's because they were early with the **co-in-ci-dent-al** lock * * * the AAA contest board is allowing the use of the official AAA emblem on tested products found satisfactory * * * grade crossings are born at the rate of 500 a year . . . maybe the answer is **berth** control * * *

## Radiator Makers Merge

PARIS, Dec. 16 (*by mail*)—Chausson, Gallay and Moreux, three of the leading radiator manufacturers in France, who are responsible for 90 per cent of the national production of automobile and aviation radiators and tanks, have joined forces with a view to solidifying their interests. It is understood that the three will maintain one commercial and sales organization, but that their manufacturing interests will remain independent.

## Sloan Points Out Need For Courage

### General Motors Head Says This Quality Determines the Future

NEW YORK, Dec. 23—Speaking over a national network of radio stations during the General Motors Family Hour program last night, Alfred P. Sloan, Jr., president of General Motors, after greeting the dealer family of the corporation, said, in part:

"An open mind and a willingness to face facts will have an important influence on the future of the individual or institution during the next few years. Those individuals or institutions who recognize this fact and capitalize it with courage and determination are the ones to whom will come the greater measure of success."

He also said that industry must recognize its responsibilities toward stockholders and employees.

"To the fullest extent should opportunity be accorded in some form for all individual workers to establish a competency during the years of activity to provide for the years of reduced activity or inability to further produce," he said.

## Additional Show Events

NEW YORK, Dec. 23—Nash dealers will be entertained at luncheon on Wednesday, Jan. 7 (12 noon), at the Hotel Pennsylvania, as part of the New York show week program. During the Chicago show they will have luncheon at the Congress Hotel, 12.30 p. m., Tuesday, Jan. 27.

Chevrolet dealers will banquet at the Palmer House on Wednesday, Jan. 28, in connection with the Chicago show week program.

The meeting of the Motor Truck Committee of the National Automobile Chamber of Commerce is scheduled for 2 p. m., Tuesday, Jan. 6, during the New York show.

## Rockne to Address Dealers

NEW YORK, Dec. 23—Knute Rockne, who will appear on the program of the S.A.E. annual dinner, will also address the pre-show banquet of the Automotive Merchants Association of New York, to be held Jan. 2.

# Men of the Industry and What They Are Doing

## England Joins Houdaille

Houdaille-Hershey Corp. has added W. E. England, for many years prominent in automotive engineering circles and for the last 10 years chief engineer of The F. B. Stearns Co., to the engineering staff of the Houde Engineering Corp., Buffalo.

Mr. England will cooperate with Prof. Merritt L. Fox, formerly of the University of Iowa, in research and development engineering for the Houdaille division of Houdaille-Hershey Corp.

## Buick Names Lindsey

S. S. Lindsey has been appointed manager of Buick Chicago office, C. W. Churchill, general sales manager in the company's Flint, Mich., office, has announced. Mr. Lindsey is one of the old-timers in the Buick organization, having joined the company more than eighteen years ago. He has served in various capacities with the organization, coming to Chicago from the management of Buick in Oklahoma City.

## Nash Appoints Larson

M. N. Larson has been appointed Nash district manager for the West Coast territory, with headquarters in Oakland, Calif. Mr. Larson has been a special Nash factory representative for the past five years, operating in the Northwestern United States and the western part of Canada.

## Knoble is Named

Clifford Knoble, director of advertising for Chrysler Motor Corp., has been appointed to the advertising committee of the National Automobile Chamber of Commerce, according to announcement by Edward S. Jordan, chairman of that committee.

## Continental Names Brown

Robert Insley, vice-president of Continental Aircraft Engine Co., announces the appointment of Willis C. Brown as director of sales and service. Mr. Brown was recently vice-president in charge of sales at Warner Aircraft Corp., Detroit.

## Page Made Bank Director

De Witt Page, president of the New Departure Manufacturing Company, has been elected a member of the board of directors of the City Bank & Trust Company of Hartford, Conn.

## Sicklesteel Joins Muncie

David T. Sicklesteel, formerly chief engineer of the Detroit Gear and Machine Co., has joined the engineering staff of the Muncie Products Division of the General Motors Corp.

## Dodge Appoints Clancy

The appointment of Walter F. Clancy as regional truck representative for the Detroit region is announced by Dodge Bros. Corp.

## Fedders Elects Wilson

R. D. Wilson, president of the Wilson Foundry and Machine Co., Pontiac, has been elected a director of the Fedders Mfg. Co., Buffalo.

## Multibestos Names Smith

H. B. Smith has been added to the Detroit staff of the Multibestos Co., Walpole, Mass.

## J. E. Barrett Dies

DETROIT, Dec. 23—Joseph E. Barrett, fifty years old, died Monday following a six months' illness. He was president of the Joseph E. Barrett Co., makers of mechanical conveyor machinery. Previously, he was the superintendent of the Palmer-Bee Co.

## Petroleum Facts Issued

NEW YORK, Dec. 23—The American Petroleum Institute issued today Article II of the preliminary draft of Petroleum Facts and Figures for 1930. This section contains summary figures of world consumption of petroleum, United States petroleum production and imports, relation of petroleum exported to United States production and imports, in 1929, exports of petroleum and its products from the United States, value of exports of petroleum, etc.

## Olds Shifts Eight

DETROIT, Dec. 23—L. J. Blunden has been appointed manager of the Atlantic Region of Oldsmobile with New York headquarters. During several years connection with Oldsmobile has held executive sales positions in Kansas City, Chicago, and Pittsburgh. E. F. Glenny has been transferred as manager from the Atlantic to the Pacific region with San Francisco headquarters. He was formerly zone manager at Minneapolis. F. G. W. Sudrow has been appointed San Francisco zone manager. Frank J. Ackerman returns as Cleveland zone manager, a position he held until a year ago, succeeding Russel D. Lesher, transferred to the managership of the Buffalo zone. H. A. Trevellyan returns as manager of the Chicago zone, succeeding J. J. Young, who is transferred to the managership of the Minneapolis zone.

## Building Activity Is Confined to Small Jobs

### Machine Tool Sales Hit Low Point

PHILADELPHIA, Dec. 24—In spite of the extremely low levels of machine tool orders, recovery is expected early in January, reports from many manufacturing centers indicate.

Purchases of new equipment by car and truck manufacturers are the lowest since 1924, according to one authoritative report.

Building activity in the automotive industry is almost entirely confined to new repair and service garage construction and factory branch programs by supplier and accessory concerns. Airport and plane reconditioning shop construction is at its seasonal low point, however.

Among the reports for the first half of December were:

**Charles Schaefer, Jr.,** New York, architect, is planning a $200,000 service and repair garage, construction to begin this month.

**James J. Millman, Inc.,** Brooklyn, architect, planning $100,000 repair and service garage.

**Fischer & Dackerman,** Elizabeth, N. J. (automobile bodies), awarded contract for plant addition to cost $60,000.

**Rolls-Royce of America, Inc.,** Springfield, Mass., will move Brewster Body operations from Long Island City to Springfield. Expansion of operations is planned by company.

**Philadelphia Storage Battery Co.,** Philadelphia, has purchased land for $150,000, factory addition.

**Moto Meter Gage & Equipment Corp.,** Toledo, will spend $100,000 for additional factory facilities at the La Crosse, Wis., branch.

**Ford Motor Co.,** Dearborn, Mich., planning a new line of commercial car bodies. Plans under way for increasing manufacturing facilities in several assembly plants.

**Chevrolet Motor Co.,** Detroit, considering new plant in Oklahoma City for manufacturing commercial car bodies. Plant to cost $100,000. Similar plant to be constructed in Knoxville, Tenn.

**Montgomery (Ala.)** municipal airport engineer has received approval of plans for $125,000 reconditioning shop and additional hangar facilities.

**Marmon Motor Car Co.,** Indianapolis, Ind., planning construction of new body plant. Part of plant will be occupied by Hayes Body Corp., Grand Rapids, for building bodies for Marmon Co.

**Siegel & Levy,** New York, architects, will soon undertake construction of $100,000 repair and service garage.

**Motoramp Garages of N. J., Inc.,** purchased land in Jersey City for $400,000 garage with repair and service facilities. Structure to be eight stories.

## The Production Index

*Automotive Industries* regrets that the necessity of closing its news forms for this issue on Tuesday, Dec. 23, did not permit time for the individual manufacturers contributing to its Weekly Production Index to compile and forward the figures requested. The estimate of production for the week ending Dec. 20 will appear in *Automotive Industries* for Jan. 3.

## Chevrolet Dealers to Meet

RALEIGH, N. C., Dec. 22—Between 600 and 700 Chevrolet dealers and salesmen will gather here early in January for a meeting. The Chamber of Commerce is assisting in arrangements for the occasion.

## Mukden Truck Plant Progressing

### Manchurian Venture to Make Heavy Types

WASHINGTON, Dec. 22—The plan of the Manchurian government to manufacture trucks at the Liaoning Trench Mortar Works, Mukden, Manchuria, has reached the stage of purchasing equipment and choosing personnel, according to a report from the Automotive Division, Bureau of Foreign and Domestic Commerce, based on advices from Consul General M. S. Myers, Mukden.

The works is owned and controlled by the commander-in-chief of the Northwestern Frontier Defense Forces, Mukden, and is managed by the director-general of the trench mortar arsenal. Its capital has been fixed at about U. S. $270,000, of which $100,000 has been invested in buildings.

Besides trucks, heaters and tannery products will also be produced at the works. The truck is of American design, and some component parts have already been purchased in this country. The truck is a heavy type.

## Niagara Opens Detroit Office

BUFFALO, Dec. 22—The Niagara Machine and Tool Works has opened a branch office in Detroit, at 3-217 General Motors Building. Russell J. Caplin will be in charge.

## Financial Notes

**Allied Motor Industries** has omitted the regular quarterly dividend of $1 on preferred payable Jan. 1, 1931.

**Black & Decker Mfg. Co.** has declared regular quarterly dividend of 50 cents on preferred payable Dec. 31 to holders of record Dec. 19.

**Eaton Axle & Spring Co.** has declared regular quarterly dividend of 40 cents payable Feb. 1 to holders of record Jan. 15.

**Gemmer Mfg. Co.** has declared regular quarterly dividend of 15 cents on Class B payable Jan. 2 to holders of record Dec. 24.

**Graham-Paige Motors Corp.** has declared regular quarterly dividend of $1.75 on seven per cent preferred payable Dec. 31 to holders of record Dec. 15.

## Fiat Buys Pescara

PARIS, Dec. 13 (*by mail*)—The Italian Fiat Company has purchased the Pescara automobile factory at Barcelona, Spain, for the sum of 2,000,000 pesetas, and will make use of it for the production of Fiat cars for the Spanish market. This automoblie company was organized by M. Pescara, with the backing of the late Primo de Rivera, and was known as the National Spanish Automobile Company. It was given the privilege of importing parts duty free, its cars were not liable to taxation, and important government subsidies were expected. With the fall of Primo de Rivera, this assistance was stopped and a few months ago the factory ceased production.

## Argentina Jumps Duty on Trucks

### Will Be Taxed on Passenger Vehicle Basis

WASHINGTON, Dec. 22 — Motor trucks are to be dutiable at 32 per cent, including surtax, on the c. i. f. Buenos Aires value, as a result of a decree of the Argentine Ministry of the Treasury, dated Dec. 12. The duty, the same as that now applying to passenger automobiles, says a cable from Acting Commercial Attache James B. Burke, becomes effective 30 days after publication of the decree. Tractors remain duty-free. The decree repealed the exemption from import duty on motor trucks which have heretofore been classified as tractors provided they could meet a certain pulling test.

## Carolina Sales Slump

RALEIGH, N. C., Dec. 22—November automobile sales in North Carolina totaled 1780, the smallest number of cars sold in any one month since 1923, when the automobile law which authorized an accurate check on sales was put into effect, according to the state motor vehicle bureau officials.

The month's sales brought the year's total for new car sales to 37,561, as compared with 69,708 for the first eleven months of last year. November sales, last year, were 4002.

Ford led all other makes last month with 915 sales.


**Executives, machinists and other employees of Bridgeport Machine & Tool Co., now the Bullard Co., taken 50 years ago soon after the company was organized by the late E. P. Bullard. The Bullard Co. is celebrating its golden anniversary this year**

## Equipment Index Drop for November

**Figure is 62 For the Month**

NEW YORK, Dec. 22—November business in parts and accessories fell considerably behind October business in all branches, according to index figures prepared by the Motor and Equipment Association. Based on January, 1925, as 100, original equipment index for November was 62, as compared with 75 in October and with 78 in November a year ago.

Service parts index was 127, as compared with 140 in October and 139 last year. Accessories index was 63, as compared with 79 in October and with 83 in November, 1929. Service equipment index was 80, as compared with 99 in October and with 115 in November of last year.

The grand index for the industry was 72, as compared with 86 in October and 90 a year ago. It will be noted that declines, as compared with October, are mostly seasonal and not out of line with this year's trend, as compared with last year. Wholesaler's sales during the month, based on January, 1928, as 100, were 132, as compared with 155 in October and with 147 a year ago.

Accounts receivable on wholesaler's books also showed a decline, as compared with both October and with November of last year, but the decline was not as marked as it is in sales.

## Michigan Tube Forms Division

DETROIT, Dec. 22—Chas. E. Miller, president and general manager of the Michigan Steel Tube Products Co. of Detroit, announces the organization of a subsidiary to be known as the Miller-Shelby Products Division. The new company will have headquarters in Shelby, Ohio, where a plant will be located for the manufacture of parts for aircraft, automobiles and tractors.

## Cadillac to Resume at Normal

DETROIT, Dec. 22—The normal payroll of approximately 6000 men will resume work at the Cadillac Motor Car Co., on Jan. 5, it was announced today by A. U. Widman, works manager. This number is exclusive of 1000 salaries employees, and means that more than 500 former employees will be recalled.

## To Handle Motor Wheel Exports

NEW YORK, Dec. 23—Export activities of the Motor Wheel Corp. have been taken over by W. D. Blood & Co., 30 Water St., New York. W. D. Blood, president of the Blood company, has been named export manager of Motor Wheel. Sales in all foreign countries, except Canada, will be handled under the arrangement with the Blood organization.

**New White Head**

**Ashton G. Bean, whose election to head the White Co., Cleveland, was announced last week in Automotive Industries**

## Cleveland Gets Air Races

CLEVELAND, Dec. 23—An agreement has been signed between the National Aeronautic Association and National Air Races, Inc., Cleveland, under which the annual races will be held in Cleveland for the next five years, with an option for a five-year renewal of the agreement. Signers of the agreement were Senator Hiram Bingham, president of the N.A.A., and L. W. Greve, president of the Cleveland Pneumatic Tool Co., and of National Air Races, Inc. The agreement requires the Cleveland group to fulfill the routine conditions, including the posting of prize money and following this, grant the sanction of the National Aeronautic Association.

## U. S. Rubber Continues Policy

DETROIT, Dec. 22—The tire department of the United States Rubber Co. will continue its long-established policy of giving the dealers bonuses based on a certain volume of business, according to L. M. Simpson, general sales manager of the tire department at Detroit. Reports emanating from a convention of its district managers to the effect that this policy would be abandoned and a system of immediate discounts established in its place are incorrect, Mr. Simpson stated.

## States to Spend $840,850,000

PHILADELPHIA, Dec. 22—The 48 states will spend a total of $840,850,000 on the construction and maintenance of highways during the year 1931, according to figures compiled from state highway departmental sources by the American Road Builders Association.

## Morris Announces Cheaper Minor

**Is Lowest-Priced Production Job on U.K. Market**

LONDON, Dec. 23 (*by cable*)—Morris Motors, Ltd., is putting in production a low-priced version of the Morris Minor chassis, which, with a two-passenger body, folding top, side shields, luggage space under the rear deck and a concealed spare wheel, is to sell at £100 ($485). The engine has side valves instead of valves actuated by an overhead camshaft. Its bore and stroke are 2¼ by 3¼ in., giving a piston displacement of 52 cu. in. The wheel track is 42 and the wheelbase 75 in.

There is no comparable two-passenger model in the regular Minor line, the four-passenger Minor selling at £130; the Austin Seven is £122. This latter model has an engine displacement of 46 cu. in., a track of 40 in. and a wheelbase of 75 in. and is made in both two and four-passenger models. Economies in production of the new Morris are said to result chiefly from the use of an L-head engine and from simplification in the bodywork, the body finish being in lacquer in one color only, gray, with red upholstery. A speed of 50 m.p.h. and a fuel mileage of 40 to the Imperial gallon are claimed.

## More Livestock Trucked

NEW YORK, Dec. 22—For the second consecutive month, more livestock was hauled into the market in Kansas City by truck during November than by railroads, according to the National Automobile Chamber of Commerce. Trucks hauled 75,115 head into the markets, as compared with 64,037 hauled by railroads. The November truck haulage represents an increase of 13 per cent over November of last year.

## Swedish Sales Hold Up

NEW YORK, Dec. 22—Sales of motor vehicles in Sweden during 1930 fell only slightly below the record of 1929, according to Emil Salmson, vice-president of the Royal Automobile Club of Sweden and president of the Swedish Automobile Dealers Association. Mr. Salmson, who has long been a leader in automotive circles in Stockholm, is here to visit the national show and to participate in the International Day events in connection with the show.

## Rubber Output Reported

NEW YORK, Dec. 22—Production of crude rubber on estates of more than 100 acres in the Far East during November totaled 21,673 tons, according to advices received by the Rubber Exchange of New York last week. Production on estates under 100 acres totaled 14,914 tons. Total stocks in the Far East on November 30 were 17,974 tons.

## International Day Exercises Planned

### N.A.C.C. Will Welcome Many Foreign Visitors

NEW YORK, Dec. 22—The program for International Day exercises to be held at headquarters of the National Automobile Chamber of Commerce in conjunction with the New York show has been announced by Robert C. Graham, chairman of the Export Committee, who will preside.

Following a buffet luncheon, Alvan Macauley, president of the Chamber, will welcome the visitors. The forum for the afternoon includes the discussion of associational work on which Ernest M. Smith, general manager of the American Automobile Association, will speak, and Emil Salmson, president of the Automobile Dealers Association of Sweden, will head the discussion.

H. H. Rice, chairman of the taxation committee of the N.A.C.C., will speak about legislation, and the discussion on this subject will be headed by R. A. Cavin, vice-president of the American Automobile Club of Europe.

Roy D. Chapin, chairman of the highways committee of the N.A.C.C., will speak on highways, and the discussion on this subject will be led by F. A. Rettanah of Beyrouth, Syria.

Paul G. Hoffman of the street traffic committee, will speak on traffic, and the discussion on this subject will be lead by Paul Cappel, of the Automobile Dealers Association of Germany.

C. A. Vane, general manager National Automobile Dealers Association, will speak on selling, and J. G. Shirley, president of the Automobile Dealers Association of Mexico, will lead this discussion.

Victor L. Brown, president of the National Association of Finance Companies, will speak on finance, and Eugene Price, European representative of C.I.T., will lead the discussion on that subject. Following the formal discussions there will be an open forum in which any of the guests may participate.

## Awards Airway Contracts

WASHINGTON, Dec. 22—Twenty-three contracts totaling $95,660.21 have been awarded by the Aeronautics Branch of the Department of Commerce. The contracts, which include equipment for use on the airways and items for miscellaneous use, range in size from $54,608.15, the highest, to $51, the lowest.

## Globe Forms Subsidiary

MILWAUKEE, Dec. 23—Globe Steel Tubes Co. has formed a subsidiary, Globe Stainless Tube Co., to design, engineer and manufacture corrosion and heat-resisting tubes for a variety of uses. Officers of the company will be the same as those of the parent company.

### EVENTS DURING NEW YORK SHOW WEEK

Auto. Merchants Asso., Pre-Show Dinner, Commodore ..... Jan. 2
Pierce-Arrow, Luncheon, Plaza Hotel, Jan. 3
International Registration, N.A.C.C. Office ..... Jan. 3
Studebaker Corp., Dinner, Commodore, Jan. 3
Franklin Mfg. Co., Luncheon, Commodore ..... Jan. 5
Packard Motor Car Co., Luncheon, Roosevelt, 12.15 noon ..... Jan. 5
Nat'l Auto. Dealers Asso., Meeting, Commodore ..... Jan. 5
International Luncheon, N.A.C.C. Office ..... Jan. 5
Hupp Motor Car Co., Luncheon, Commodore ..... Jan. 5
International Trade Conf., Meeting, N.A.C.C. Office ..... Jan. 5
Rubber Manufacturers Asso., Dinner, Commodore ..... Jan. 5
Metropolitan Section S.A.E., Dinner, Commodore ..... Jan. 5
Nat'l Asso. of Show & Asso. Mgrs., Luncheon, Roosevelt, 12.30 noon, Jan. 6
Auburn Automobile Co., Luncheon, Commodore ..... Jan. 6
Hupp Motor Car Co., Luncheon, Commodore ..... Jan. 6
Nat'l Auto. Chamber of Com., Banquet, Commodore ..... Jan. 6
Marmon Motor Car Co., Luncheon, Commodore ..... Jan. 7
Hupp Motor Car Co., Luncheon, Commodore ..... Jan. 7
Nat'l Auto. Chamber of Com., Directors' Meeting, N.A.C.C. Offices..Jan. 7
Federal Distributors, Meeting, Commodore ..... Jan. 7
Federal Distributors, Dinner, Commodore ..... Jan. 7
Motor & Equipment Asso., Dinner, Astor ..... Jan. 7
Chevrolet Motor Co., Dinner, Commodore ..... Jan. 7
Willys-Overland Co., Banquet, Commodore ..... Jan. 8
Olds Motor Co., Dinner, Hotel Astor, Jan. 8
Hupp Motor Car Co., Luncheon, Commodore ..... Jan. 8
Overseas Automotive Club, Dinner..Jan. 8

### EVENTS DURING CHICAGO SHOW WEEK

Chicago Auto Trade Asso., Pre-Show Dinner, Congress ..... Jan. 23
Pierce-Arrow, Luncheon, Stevens..Jan. 26
Franklin Mfg. Co., Luncheon, Blackstone ..... Jan. 26
Hupp Motor Car Co., Luncheon, Stevens ..... Jan. 26
Nat'l Auto. Dealers Asso., Meeting, Palmer House ..... Jan. 26
Studebaker Corp., Dinner, Sherman, Jan. 26
Hupp Motor Car Co., Luncheon, Stevens ..... Jan. 27
Federal Distributors, Meeting, Stevens, Jan. 27
Federal Distributors, Banquet, Stevens Jan. 27
Nat'l Auto. Dealers Asso., Banquet, Commodore ..... Jan. 27
Auburn Automobile Co., Luncheon, Stevens ..... Jan. 27
Packard Motor Car Co., Luncheon, Blackstone, 12.15 noon ..... Jan. 27
Nat'l Asso. of Show & Asso. Mgrs., Luncheon, Palmer House, 12.30 noon ..... Jan. 27
Hupp Motor Car Co., Luncheon, Stevens ..... Jan. 28
Nat'l Auto. Chamber of Com., Directors' Meeting, Stevens ..... Jan. 28
Marmon Motor Car Co., Luncheon, Palmer House ..... Jan. 28
Olds Motor Works, Dinner, Congress, Jan. 28
Willys-Overland Co., Banquet, Palmer House ..... Jan. 29

## Juhasz Has New Carburetor

NEW YORK, Dec. 22—The Juhasz Carburetor Corp., which has been manufacturing special carburetors for a number of years, has developed for commercial use a tri-fuel carburetor which it claims will eventually eliminate carbon monoxide, effect considerable fuel economy and permit the use of gasoline, kerosene and fuel oil in any internal combustion engine.

## Census Shows Gain in Use of Rubber

### Increase in 1929 Was 21.2 for Crude

WASHINGTON, Dec. 22—The Bureau of the Census announces that, according to a preliminary tabulation of data collected in the Census of Manufacturers taken in 1930, establishments in the United States engaged wholly or principally in the manufacture of rubber products consumed, in 1929, 441,343 long tons of crude rubber, costing $200,451,421, and 198,379 long tons of reclaimed rubber, costing $26,223,061.

These figures represent increases in quantity of 21.2 per cent and 12.9 per cent, respectively, as compared with 364,057 long tons of crude rubber and 175,774 long tons of reclaimed rubber reported for 1927, the last preceding census year. No data were collected for 1927 on costs of crude and reclaimed rubber consumed.

Stocks of crude rubber on hand increased from 45,733 long tons at the close of 1927 to 48,644 long tons at the close of 1929, and stocks of reclaimed rubber decreased from 16,581 long tons to 13,378 long tons for the same period.

The quantities and costs of other important materials consumed in the rubber industries in 1929 were as follows: Carbon black, 163,037,612 lb., at a cost of $12,676,825; zinc oxide, 129,847,125 lb., $8,886,432; sulphur, 59,301,917 lb., $1,293,165; tire fabrics, 270,444,035 lb. $122,267,337; hose and belting duck, 34,335,673 lb., $12,503,-375; other cotton fabrics, 65,900,833 lb., $27,552,210; other fabrics, $11,-280,682.

## German Tire Exports Drop

WASHINGTON, Dec. 22—During the month of October Germany exported 22,083 casings as compared to 31,255 during the corresponding month of 1929, according to the Rubber Division, Bureau of Foreign and Domestic Commerce. Inner tubes exported during the month numbered 15,658, as compared with 20,243 in the same period of 1929. Five hundred and fifty-six solid tires were exported in October, as compared with 933 in the same month of 1929.

## Motor Boat Exports Gain

WASHINGTON, Dec. 23—American exports of motor boats and engines during the year 1929 were valued at $5,093,412, according to a Department of Commerce Survey. This figure is an increase of 32 per cent over that for the preceding year, and of 289 per cent over the figure for 1924.

## N. S. P. A. Expands Offices

DETROIT, Dec. 22—Headquarters of the National Standard Parts Association, which has been located at 1210 Eaton Tower, Detroit, has been moved to suite 1304 in the same building.

## November Sales in Michigan Drop

### Were 16 Per Cent Under October Figures

DETROIT, Dec. 22—New passenger car registrations in the State of Michigan during November totaled 4201, a decrease of 788, or approximately 16 per cent from the total of 4989 registered in October and a decrease of 1929, or 31 per cent, from the November, 1929, total of 6130.

Ford registrations in Michigan last month—representing more than 36 per cent of all makes—were 1538, a decrease of 650, or approximately 30 per cent, from the Ford October total of 2188 and a decrease of 934, or 37 per cent, from the Ford November, 1929, total.

The Chevrolet passenger car registrations last month totaled 1194. Buick was third with 282, Essex fourth with 145, Plymouth fifth with 89 and Pontiac sixth with 72.

Total commercial car registrations in Michigan last month were 840, a decrease of 282, or 25 per cent, from the total of 1122 in October and an increase of 71, or 8 per cent, over the total of 769 in November, 1929. Ford showed a total of 523, as compared with 780 in October and with 505 in November last year. Chevrolet was second with 190 and Dodge third with 26.

## Sees Lighter Engines

MILWAUKEE, Dec. 22—Application of tungsten carbide on cutting tools can reasonably mean automobile engines 25 per cent lighter because certain alloys, heretofore unmachinable, can now be handled successfully and at record speeds. This was a high light in a talk given before the December meeting of the Engineers Society of Milwaukee by Frank W. Curtis, research engineer of the Kearney & Trecker Corp., Milwaukee.

Mr. Curtis declared that fully $100,000,000 worth of machine tools are being made obsolete as the result of the application of tungsten carbide to cutting tools, because when an old machine fails to earn what a new machine can, the change will come.

## To Begin Deliveries to Russia

RACINE, WIS., Dec. 22—The J. I. Case Co. is starting deliveries in January on an order for 4000 tractors for the Soviet government of Russia, it has just been revealed. The order amounts to $5,400,000. Production was started late in September and will be completed in February. Ten Russian engineers directed by Amtorg for two months have been studying in the Case plant. One, G. Pavlowski, is learning every process in tractor manufacture and the others are specializing. Two other highly trained engineers already have returned to Russia to aid in the introduction of American methods in the Kharkoff tractor works.

## Ford of Canada Sales Hold Up

EAST WINDSOR, ONT., Dec. 21—Wallace R. Campbell, president of the Ford Motor Co. of Canada, Ltd., in a general letter to Ford dealers, says that: Thus far in 1930 the Ford Motor Co. of Canada, Ltd., and its dealers have maintained sales at a level closely approximating those of 1929. This is a marked contrast to the general 40 per cent decline in motor car sales in Canada this year.

## Highway Buys Martin Trailer

WESTFIELD, MASS., Dec. 24—The Martin Trailer Co. has been purchased by the Highway Trailer Co. of Edgerton, Wis., which acquires the machinery and stocks and also the patent rights, name and goodwill attaching to the Martin Rocking Fifth Wheel and related parts. A new company will be formed having the same name as before, and production of the line will be continued at the same site. Sales henceforth will be only to truck and trailer manufacturers, and in no instance to fleet owners.

## Canadian Exports Drop

TORONTO, Dec. 22—Exports of automobiles in the month of October numbered 2868 cars, as compared with 4546 in the previous month of this year. The total value of the exports amount to $1,462,116 as against September's total value of $1,991,567. During the current fiscal year ended October exports numbered 49,091 with a combined value of $20,916,662, as compared with 106,369 cars valued at $46,434,369 in the previous year.

The exports included 865 trucks valued at $319,980 and 2003 passenger cars worth $925,636. Automobile parts were valued at $102,215.

## Kerby Sees Improvement

TORONTO, Dec. 22—In a letter to the shareholders, Roy D. Kerby, president of Durant Motors of Canada, Ltd., tells that the company has entered upon the last month of a year fraught with obstacles that have looked at times almost unsurmountable, and while the company will not make as good a showing as in the previous year, Durant Motors has been successful in maintaining a particularly outstanding liquid capital position and the company is in a better position than ever, with the factory inventory much improved.

## Steel Founders' Schedule

NEW YORK, Dec. 22—The Steel Founders' Society of America, Inc., has announced the following meetings: Annual meeting and election of officers Thursday, Jan. 29, 1931, at Hotel Hollenden, Cleveland, Ohio; March meeting, to include a sales clinic, March 19 and 20, at the Neil House, Columbus, Ohio; April meeting on April 23, at Pittsburgh, Pa.

## Plans Wide Survey of Foreign Markets

### Automotive Division Will Collect Data

WASHINGTON, Dec. 23—Anticipating the lifting of the present depression in foreign markets, the Automotive Division, Bureau of Foreign and Domestic Commerce, has begun a world-wide survey of conditions in the foreign field, with respect to the demand for automotive parts, accessories and garage equipment. The 60 foreign offices of the Department of Commerce and 58 American consulates located in important centers, will cooperate in making the survey.

In announcing this survey the Automotive Division says: "For the guidance of trade commissioners and consuls who will collect the necessary information abroad, a questionnaire, prepared with the collaboration of the equipment industry, has been sent to each foreign officer.

"Among the subjects contained in the questionnaire are: growth of foreign market; extent of American participation in the trade; leading distribution centers, channels, methods and trends; terms of payment, foreign competition; how foreign gains have been made; anti-American propaganda; special requirements or local preferences; advertising methods and media, etc."

The information gathered in the survey will be made available to interested American manufacturers.

## N. J. Rubber Men Elect

TRENTON, N. J., Dec. 22—Rubber Mfgrs. Association of New Jersey recently held its annual meeting and elected the following officers: president, John A. Lambert, Acme Rubber Co.; vice-president, I. Ely Reed, Mercer Rubber Co.; secretary, Charles E. Stokes, Jr., Home Rubber Co.; treasurer, Horace B. Tobin, Woven Steel Hose and Rubber Co. A. V. Viles, vice-president and general manager of the Rubber Association of America, gave a talk on "Rubber Conditions."

## Nash Adds 95 Dealers

CHICAGO, Dec. 22—Ninety-five new automobile dealers have joined the Nash distributing organization since the introduction of the four new series of cars in October, C. H. Bliss, general sales manager of Nash Motors Company, announces. In addition to these new dealers, Mr. Bliss says, there are many new dealer contracts now in the process of completion.

## Designing New Bus

CHICAGO, Dec. 22—Chicago Motor Coach Co. engineers are designing a new model bus with a special underslung chassis, center aisle, hot water heat, front and rear doors and pneumatic tires.

## Business in Brief

### Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Dec. 24—Retail trade was better last week, especially in the earlier part, when the weather was very cold. Christmas buying has been maintained at fairly satisfactory levels, although it is noticed that the cheaper goods move more easily, while luxury items are difficult to sell. Wholesale and jobbing trade was slow, while the large industries showed no improvement.

**EXPORTS**

Exports during November amounted to $289,000,000, the lowest for any month since 1922, excepting July, 1930, and July, 1924, as compared with $327,169,000 during the preceding month and $442,254,000 a year ago. Imports during November amounted to $204,700,000, the lowest for any month since October, 1921, as compared with $247,324,000 during the preceding month and $338,472,000 a year ago.

**FARM PRODUCTS**

The total value of all agricultural products produced this year, according to a report issued by the Department of Agriculture, is estimated at $6,274,824,000, as against $8,675,420,000 in 1929 and $8,495,788,000 in 1928.

**COTTON CONSUMPTION**

Cotton consumed in November amounted to 469,664 bales, including linters, as against 510,670 bales in the preceding month and 604,367 bales a year ago.

**CRUDE OIL OUTPUT**

Average daily crude oil production for the week ended Dec. 13 amounted to 2,232,850 barrels, as against 2,229,250 barrels for the preceding week and 2,622,250 barrels for the corresponding week last year.

**CAR LOADINGS**

Railway freight loadings for the week ended Dec. 6 totaled 787,173 cars, which marks a decrease of 146,136 cars below those a year ago and a decrease of 197,600 cars below those two years ago.

**FISHER'S INDEX**

Professor Fisher's index of wholesale commodity prices for the week ended Dec. 20 stood at 79.4, as against 79.8 the week before and 80.7 two weeks before.

**BANK DEBITS**

Bank debits to individual accounts outside of New York City for the week ended Dec. 17 were 17 per cent below those in the corresponding period last year.

**BROKERS' LOANS**

Brokers' loans in New York City during the week ended Dec. 17 declined $91,000,000, bringing the total down to $2,008,000,000, as against $3,222,000,000 on Sept. 4 of this year.

## Cleared 199,348 Miles of Road

WASHINGTON, Dec. 22—State and local agencies in the 36 states which lie in the snow belt cleared snow and ice from 199,348 miles of state and local highways in the winter of 1929-30, according to reports to the Bureau of Public Roads, of the U. S. Department of Agriculture. The cost of clearing 184,748 miles amounted to $8,224,368, the reports show.

## Dealers May Open on Sunday

DETROIT, Dec. 22—Members of the Detroit Auto Dealers Association have been released from an agreement made several months ago to observe Sunday as a holiday. This action follows notification of the association by the associated Chevrolet dealers that competition would force them to remain open on Sunday. Original action of the association was taken July 6, at which time 93.8 per cent of the automobile dealers in Wayne county were pledged to observe the Sunday closing agreement.

## Sees Output Growth

BOSTON, Dec. 22—A. van Der Zee, of the Chrysler Corp., talking with newspaper men here today during his visit with 15 other executives at a conference of 250 Dodge Brothers dealers from all over New England, stated that he expects to see an increase in motor production in 1931 of about 20 per cent.

He said that the Dodge Brothers production for next year is based on a total of 200,000 cars and trucks while this year the figures would reach about 107,000.

## Export Classifications Revised

WASHINGTON, Dec. 22—Effective Jan. 1, a new scale of export classifications will become effective, points out the Automotive Division, Bureau of Foreign and Domestic Commerce, in a supplement to its weekly bulletin. These revisions, changes and additions will affect almost all classes of American automotive exports and should be closely studied in detail by the manufacturers concerned, the division says.

## Black Continues Its Popularity

NEW YORK, Dec. 22—As black concludes its fourth consecutive month as the most popular color for automobile bodies, there is evidence of a turning movement which will result in its decline, according to the *Automobile Color Index* of the Duco Color Advisory Service. Blue, green, brown, maroon and gray are now trailing black in popularity, in the order named.

## Dodge Books Cab Orders

NEW YORK, Dec. 22—Over 300 orders for Dodge Brothers taxicabs have been taken in New York during the past two weeks. This represents a total volume of more than $500,000.

## Firestone Declares Regular Dividend

### Both Common and Preferred Shares Benefit

AKRON, Dec. 22—Directors of Firestone Tire & Rubber Co., on recommendation of Harvey S. Firestone, Sr., president, have declared the regular quarterly dividend of 25 cents a share on the common stock. It will be paid on Jan. 20 to stockholders of record on Jan. 5, 1931.

Payment of the regular quarterly dividend of one and one-half per cent on the Series A 6 per cent cumulative convertible preferred shares also was ordered, to be made on March 13, to stockholders of record on Feb. 13.

Hours of Firestone workers will be stepped up in January in anticipation of increased production, Mr. Firestone said in his report to the annual stockholders' meeting, which preceded that of the session of the directors.

## Plans Accessory Production

CHICAGO, Dec. 22—The Safety Driving Light Company, 307 North Michigan Ave., is getting ready to go into production on their automobile lighting accessory immediately with granting of incorporation papers by the secretary of state. The company's headquarters are at 307 North Michigan Ave. and their lights are being turned out for the present by the Indiana Lamp Company, South Bend, Ind. J. D. DeFoe, T. J. Bowns and S. R. Barnett are the incorporators. The light is the invention of Major Yates.

## Road Builders Program Set

PHILADELPHIA, Dec. 22—The program for the 28th annual convention of the American Road Builders' Association released today, lists in addition to the general sessions, one on highway administration and finance, one on airport drainage and surfacing, one on motor freight, one on snow removal and equipment, one on standardization of methods and purchasing of equipment, and one on central and truck mixed concrete. The sessions of the convention will be held in St. Louis, Jan. 12-16.

## Bridgeport Lace Opens Plant

ST. HYACINTHE, QUE., Dec. 22—The Bridgeport Coach Lace Co., Chelsea, Mass., has opened a Canadian plant here. It will include looms for making coach lace or automobile trimming for the Canadian automotive trade. The new company will employ between 50 and 60 workers, mostly female.

## French Casing Exports Gain

WASHINGTON, Dec. 22—Exports of casing from France during the month of October are estimated at 102,570, compared with 101,150 in September, by the Rubber Division, Bureau of Foreign and Domestic Commerce.

## Get $80,000,000 For Highway Work

### Federal Relief Act Includes This Item

WASHINGTON, Dec. 23—The $116,000,000 emergency relief act signed last Saturday by President Hoover includes $80,000,000 for highway construction. The entire sum is made immediately available. States which are unable to match the Federal highway funds dollar for dollar will be given the money with which to do so and the sums advanced will be taken from the regular allotment over a five-year period beginning in 1933.

The regular allotment carried in Federal aid is $125,000,000, an increase of $50,000,000 over the former allotment of $75,000,000 which was allowed up to two years ago. The Federal aid highway allotments under the act just passed are as follows:

Arizona, $1,170,481; California, $3,108,233; Colorado, $1,507,832; Connecticut, $520,491; Delaware, $400,000; Idaho, $1,008,036; Illinois, $3,400,116; Iowa, $2,116,369; Indiana, $2,045,929; Kansas, $2,192,301; Kentucky, $1,504,715; Maine, $715,799; Maryland, $678,752; Massachusetts, $1,141,460; Michigan, $2,521,382; Minnesota, $2,249,993; Missouri, $2,526,823; Montana, $1,671,930; Nebraska, $1,708,031; Nevada, $1,049,638; New Hampshire, $400,000; New Jersey, $1,107,807; New Mexico, $1,303,288; New York, $4,050,566; North Dakota, $1,298,532; Ohio, $2,998,538; Oklahoma, $1,926,351; Oregon, $1,329,287; Pennsylvania, $3,512,943; Rhode Island, $400,000; South Dakota, $1,337,973; Texas, $5,088,080; Utah, $926,521; Vermont, $400,000; Virginia, $1,505,502; Washington, $1,270,933; West Virginia, $875,384; Wisconsin, $1,992,410; Wyoming, $1,029,383; Hawaii, $400,000.

## Murray Rubber Cuts Expenses

TRENTON, N. J., Dec. 22—In order to cut down expenses following the appointment of a receiver the Murray Rubber Co. has dismissed two of its veteran employees. They are Harry E. Berrien, who was treasurer of the company for many years, and N. S. Conover, of Morrisville, Pa., assistant secretary. The latter was also employed by the company for many years. Alfred A. Branham, vice-president and general manager of the Murray company, is equity receiver. The company is now operating at 45 per cent of capacity.

## New Brunswick Revenue Up

FREDERICTON, N. B., Dec. 22—The Province of New Brunswick's revenue from motor vehicles for the fiscal year ended Oct. 31, 1930, amounted to $1,591,220.47 in cash receipts, this amount being 21 per cent greater than the receipts from the same sources in 1929 and establishes new high figures for the province.

## Olds Recalls Workers

LANSING, Dec. 22—Several thousand men have been recalled to work at the plant of the Olds Motor Works, during the past few weeks, according to an announcement from the company.

## + + CALENDAR + + OF COMING EVENTS

### SHOWS

New York, National Automobile..Jan. 3-10
National Roadbuilders' Show and Convention, St. Louis .....Jan. 10-16
Buffalo, N. Y., Automobile.....Jan. 10-17
Newark, N. J., Automobile.....Jan. 10-17
Milwaukee, Wis., Automobile ..Jan. 10-18
Cincinnati, Automobile .....Jan. 11-17
Baltimore, Automobile .....Jan. 17-24
Boston, Automobile .....Jan. 17-24
Hartford, Conn., Automobile ..Jan. 16-24
Montreal, Automobile .....Jan. 17-24
Detroit, Mich., Automobile.....Jan. 17-24
Pittsburgh, Pa., Automobile ...Jan. 17-24
Louisville, Automobile .....Jan. 19-24
Omaha, Neb., Automobile.....Jan. 19-24
Rochester, Automobile .....Jan. 19-24
Amsterdam, Automobile...Jan. 23-Feb. 1
Washington, D. C., Automobile..Jan. 24-31
Chicago, National Automobile...Jan. 24-31
Cleveland, Ohio, Automobile....Jan. 24-31
Milan, Italy, Automobile.....Jan. 24-31
Los Angeles, Calif., Automobile, Jan. 24-Feb. 1
Portland, Me., Automobile .....Jan. 26-31
Springfield, Mass., Automobile..Jan. 26-31
Syracuse, N. Y., Automobile....Jan. 26-31
Wilkes-Barre, Pa., Automobile..Jan. 26-31
Lancaster, Pa., Automobile.....Jan. 27-31
Minneapolis, Minn., Automobile, Jan. 31-Feb. 7
St. Paul, Minn. (Joint show with Minneapolis .....Jan. 31-Feb. 7
San Francisco, Calif., Automobile, Feb. 1-8
Scranton, Pa., Automobile .....Feb. 2-7
St. Louis, Mo., Automobile.....Feb. 2-7
Copenhagen, Automobile .....Feb. 8-15
Denver, Automobile .....Feb. 9-14
St. Petersburg, Fla., Automobile.Feb. 9-14
Mankato, Minn., Automobile ...Feb. 11-14
Peoria, Ill., Automobile.....Feb. 11-15
Rapid City, S. D., Automobile..Feb. 12-16
Indianapolis, Ind., Automobile..Feb. 14-19
Providence, R. I., Automobile...Feb. 14-21
Berlin, Automobile.....Feb. 19-March 1
Quebec, Automobile .....Feb. 21-28
Des Moines, Automobile .....Feb. 23-28
Seattle, Wash., Automobile, Feb. 24-Mar. 1
Camden, N. J., Automobile, Feb. 25-March 2
Geneva, Automobile .....March 6-15
Altoona, Pa., Automobile.....April 15-27
International Garage Exposition, Berlin, Germany .....May 9-Aug. 9

### CONVENTIONS

Motorcycle & Allied Trades Asso., Annual, New York City .....Jan. 7
Society of Automotive Engineers, Annual Dinner, New York .....Jan. 8
American Engineering Council Annual Meeting, Washington, D. C. Jan. 15-17
Society of Automotive Engineers, Annual Meeting, Detroit....Jan. 19-23
Natl. Association of Engine & Boat Manufacturers, New York City, Jan. 23
Natl. Paving Brick Mfg. Association, Pittsburgh, Pa. .....Feb. 4-6
Midwest Power Conference and Exhibition, Chicago .....Feb. 10-13
A. S. M. E. Fuels Meeting, Chicago, Feb. 11-13
Society for Steel Treating (National Western Metal and Machinery Exposition), San Francisco..Feb. 16-20
Southern Automotive Jobbers Association, Atlanta .....Feb. 19-21
Road Show and School, Wichita, Feb. 24-27
American Chemical Society, Indianapolis, Ind. .....March 30-April 4
Aeronautical Chamber of Commerce, Detroit .....April 11-19
U. S. Chamber of Commerce, Atlantic City ... ... .....April 28-May 1
International Chamber of Commerce, Washington, D. C.....May 4-9

### SALONS

Los Angeles, Calif., Biltmore, Hotel, Feb. 7-14
San Francisco, Calif., Palace Hotel, Feb. 21-28

NOTE: New York and Chicago Show Weeks' Events are listed on page 957 of the News Section.

## Repairmen Combat Prison Competition

### Wilmington (Del.) Group Appeals to Governor

WILMINGTON, DEL., Dec. 22—The Automobile Refinishing and Repairing Association of Wilmington, which for some time has been endeavoring to stop local prison labor competition with their business, has obtained data that it believes will aid it in its fight.

For the past two years inmates of the New Castle County Workhouse (which is also a state prison), located near Wilmington, have been competing with the trade, commercially, in repairing and refinishing motor cars. During the 23 months between Jan. 1, 1929, and Dec. 1, 1930, according to a report made by the prison trustees, a total of 1395 cars have been repaired or refinished, or both. For this work the total receipts were $34,133.61. The net profit, according to the trustees' report, was $9,160.18.

The Refinishing and Repairing Association has asked the workhouse trustees to discontinue this work, or at least confine it to cars engaged in public service. The trustees point to the necessity for keeping the prisoners at work.

The automobile association has appealed to Governor C. Douglass Buck and also the Chamber of Commerce of Wilmington. The governor has been making an investigation, with a view to attending an early conference of all interests concerned.

As the Delaware Legislature will convene Jan. 8 for its biennial session, it is believed that an effort will be made to have legislation enacted by it that will he helpful in solving the prison labor problem which exists in Delaware.

## Lycoming Adds 500 Workers

WILLIAMSPORT, PA., Dec. 22—Five hundred employees have been added to the Lycoming payroll in the last ten days, W. H. Beal, vice-president and general manager, announced today.

According to Beal, both the automotive and aircraft divisions of the company are rapidly increasing production, and indications are that 1931 will show a substantial gain in engine shipments in all divisions over the previous year.

## Will Seek Law's Repeal

TRENTON, N. J., Dec. 22—Repeal or drastic modification will be sought by State Motor Vehicle Commissioner Harold G. Hoffman of the act requiring motorists to show financial responsibility as a condition to future driving after figuring in an accident. The commissioner says the act has failed to justify the expense of administration. Less than 1.8 per cent of the cars registered in New Jersey have been insured under the act.

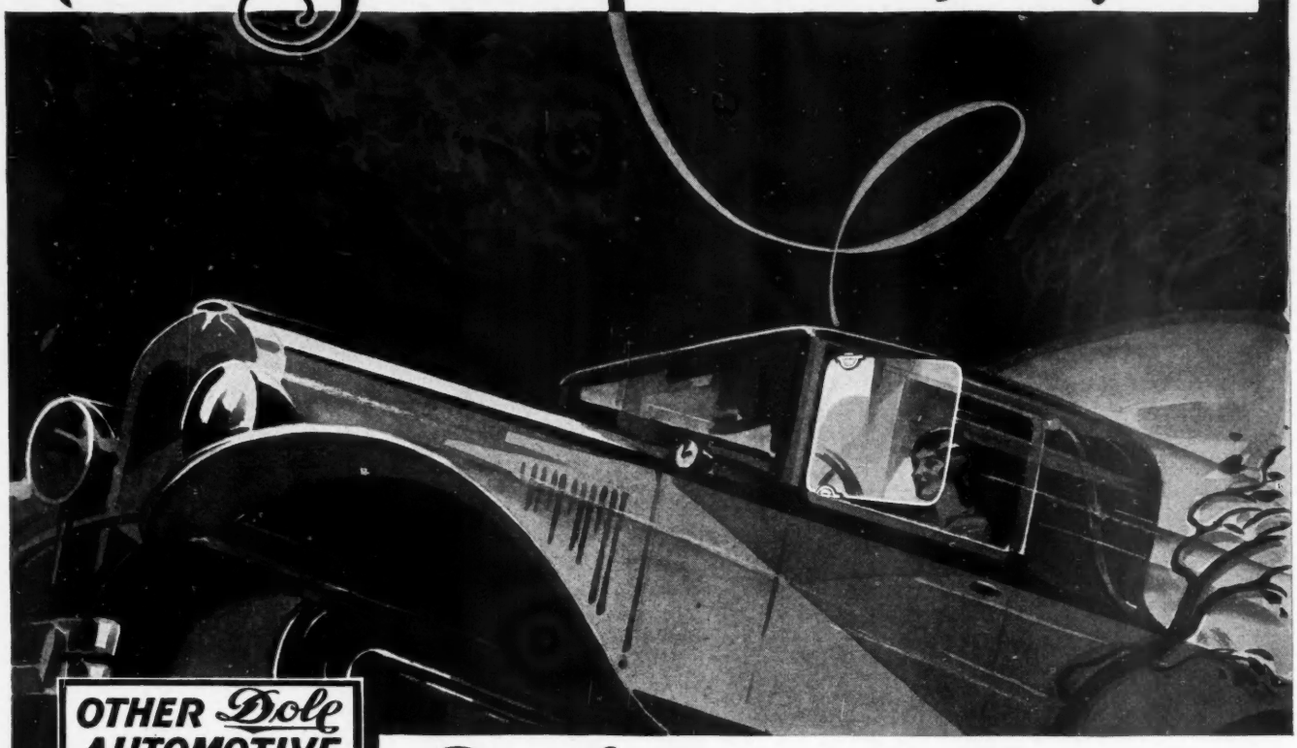
# GURNEY CLUTCH THROW-OUT BALL BEARINGS ▲ ▲ DESIGNED FOR CLUTCH SERVICE EXCLUSIVELY ▲ ▲ WILL MAKE THIS POSITION NOISELESS, EFFICIENT AND TROUBLE-FREE FOR THE LIFE OF THE CAR.

GURNEY CLUTCH THROW-OUT BALL BEARINGS ARE DESIGNED TO REPLACE THE WASHER TYPE BALL THRUST BEARINGS AND ARE MADE IN SIZES TO SUIT THE LEADING CLUTCHES ON THE MARKET. GURNEY CLUTCH THROW-OUT BEARINGS RETAIN LUBRICANT BETTER THAN ANY OTHER TYPE, THEY DO NOT DROP DOWN AND RATTLE WHEN LOAD IS RELEASED AND THEIR HIGH GRADE CONSTRUCTION ASSURES LONG LIFE.

**GURNEY BALL BEARING DIVISION**
Marlin-Rockwell Corporation
Jamestown, N. Y.

**GURNEY BALL BEARINGS**

# Adds Swank Provides Extra Comfort for Any Car



## Dole Draft Deflectors

WHETHER on the open highway . . . at the country club . . . or on the crowded city streets—Dole Draft Deflectors add a touch of smartness that draws favorable attention to the car so equipped.

Already many manufacturers are using Dole Draft Deflectors as extra equipment. For Cabriolets and De Luxe models they are just right.

Not only is the eye-appeal strong but Dole Draft Deflectors perform the important task of properly ventilating closed cars. Drafts and dust are kept out—so are bugs and driving rain. Back-seat passengers ride more comfortably. For the driver there is a new clearness of vision and freedom to signal.

Dole Draft Deflectors are installed on closed cars in five minutes without drilling or marring the car in any way. They are held firmly by tension but can be removed if necessary without leaving a scratch.

All metal parts are of brass, heavily chromium plated. There are no interfering supports—easy to clean as the window itself. Shatterproof glass is standard. Good quality plate glass is also available.

Write at once for complete information.

### OTHER Dole AUTOMOTIVE PRODUCTS

*Dole Thermostat*

*Dole Double Compression Coupling*

*Dole Ball Roll Coupling*

*Dole Leak Proof Primer*

**The DOLE VALVE COMPANY**

**1913 Carroll Avenue** **Chicago, Illinois, U. S. A.**

# HERE IS PERFORMANCE

Patented

# IN INDIANA

Cincinnati 14" x 36" Plain Self-Contained Grinder finishing steering gear lever shafts at the Ross Gear & Tool Company, Lafayette, Indiana

Precision grinding operations command an unusual amount of attention in the automotive industry. Automobile performance depends to a great extent upon the accuracy to which component parts are finished.

At the Ross Gear and Tool Company, Lafayette, Indiana, this Cincinnati 14" x 36" Plain Self-Contained Grinder plays an important part in accurately grinding parts for the automotive industry. As illustrated, carburized and hardened steel steering gear lever shafts are ground, the stock removal being .015". Limits of ± .0005" are maintained. One plunge cut is made and a production of 120 shafts per hour is obtained, this being double the former output. Here IS Performance!

Manufacturers throughout the world depend upon Cincinnati Centertype and Centerless Grinders to give them precision results. And in Indiana ... Peru, Kokomo, Gary, Evansville, Indianapolis, Jeffersonville, Anderson, Fort Wayne, Valparaiso, Muncie, South Bend, Terre Haute, etc. ... 25 cities in all ... you can observe Cincinnati Grinder performance. See these machines in operation or write to us for our illustrated bulletins.

CINCINNATI

## Cincinnati Grinders Incorporated

### Cincinnati, Ohio, U. S. A.

# KINGSTON CAN HELP YOU WITH PRODUCTION PROBLEMS

*Talk it Over With* KINGSTON

Kingston is ideally equipped to render an unusual type of specialized service to the motor car industry. Here are five great plants, with adequate facilities for prompt, economical production. Here, also, is a seasoned engineering staff, with the experience and ability to assist in problems of design and construction.

In fact, Kingston has for thirty years rendered a specialized service to the automotive industry which has simplified production problems and reduced production costs for most of the manufacturers in this field.

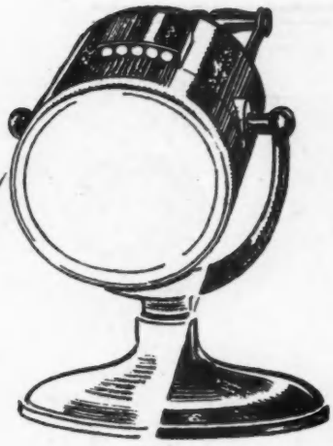
Bring your problems to Kingston. Our production facilities are at your command. You will find our engineering staff ready to work with you.

Manufacturers of Carburetors, Governors, Fuel Feeding Systems, Vacuum Tanks, Oil Pumps, Car Heaters

*Factories:* Kokomo, Indiana
*Sales Offices:* 4-170 General Motors Bldg., Detroit

KINGSTON PRODUCTS CORPORATION
KOKOMO, INDIANA, U. S. A.

# KINGSTON



# *Spotlighting a unique superiority* of BUDD DUALS

MANY truck and bus operators are now specifying 22-inch rubber in preference to 20-inch. For these larger balloons give greater carrying capacity, greater mileage and greater brake-drum clearance.

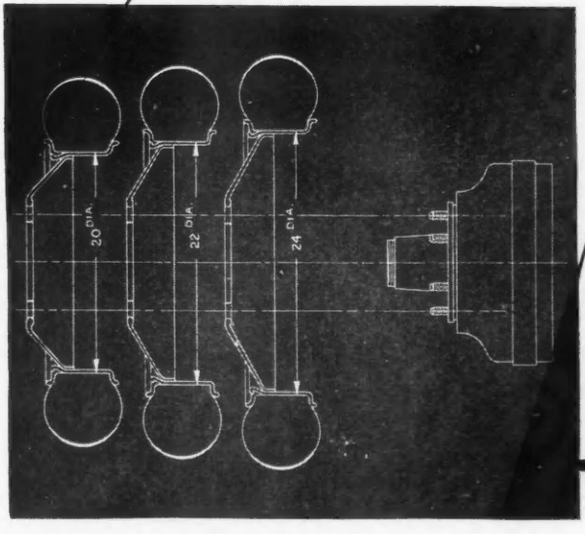
But many *other* operators still want 20 or 24-inch tires. In fact there's no telling *which* way your customers will jump when it comes to specifying wheel-size!

Naturally, you want to be able to supply *whatever* wheel-size a truck purchaser wants. You'll find this wheel problem no problem at all—if you're using Budd equipment . . .

With Budd wheel equipment, you can fill *any* wheel-size specification you get by just slapping on the right sized Budd *disc!* For with Budd equipment all wheel diameters—20, 22, or 24-inch—are interchangeable on the *same hub*. So this trend to the new tire-size necessitates your handling only new Budd *wheels*.

But . . . if your wheel equipment is *not* Budd-Michelin, supplying different wheel diameters means supplying different *wheel assemblies*, too—perhaps even different *axles*. And operators may ask you for *any* of 60 different combinations of tire, axle, wheel and rim specifications. So to be in a position to meet all their orders, you'll be saddled with an enormous inventory. Wheels, wheel parts, high pressure and balloon tires, axles, rims, rim spacings . . .

The interchangeability feature of Budd Duals is one more instance of the greater economy and service that Budd Duals give to everyone having anything to do with them—dealers, owners and drivers. It's one more reason—if you *need* another—for putting the vehicles *you're* selling on Budd Duals.




# BUDD DUALS

**BUDD WHEEL COMPANY**

*Detroit*

# Coulter Automatics

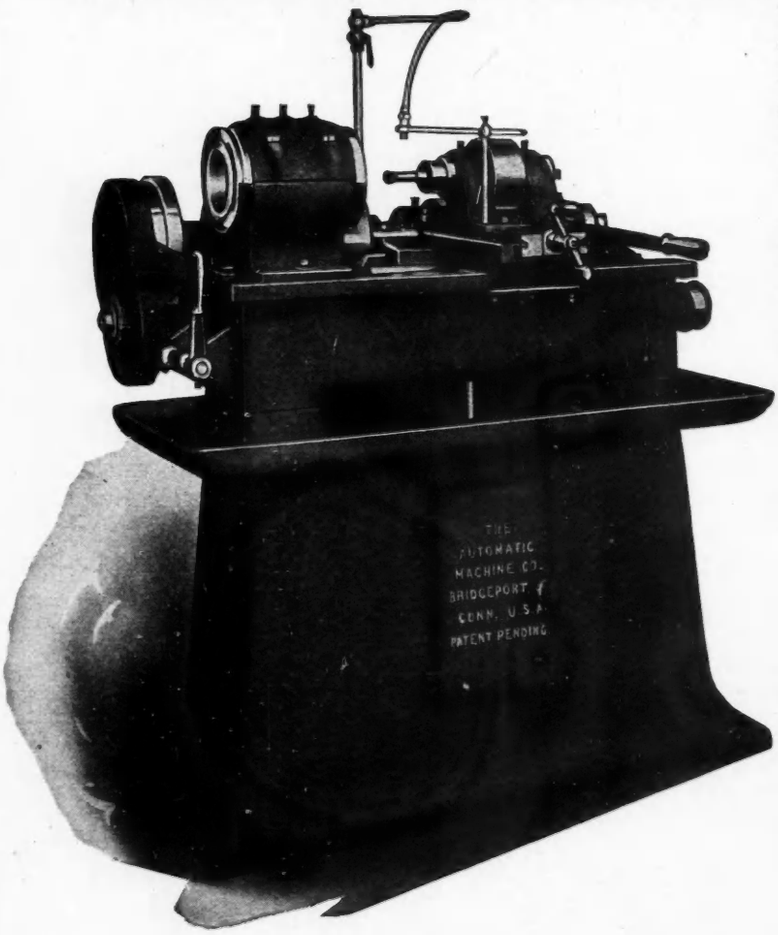
## HOB THREAD MILLING MACHINES . . .

Coulter Hob Thread Milling Machines are producing commercially perfect threads at production speed for twenty-six industrial manufacturers.

Accuracy and high quality of finished work produced on Coulters are the result of more than twenty-five years of specialized experience in the design and manufacture of threading machinery.

The Coulter automatically completes threading operations in one revolution of the work and one operator can attend several machines.

Coulter Hob Thread Milling Machines operate at milling feeds and speeds to limit of tool endurance, cut straight, taper, internal or external threads and thread up to a shoulder on parts six inches or less in diameter.




Simplicity of construction permits rapid chucking of work and micrometer adjustment allows close, accurate setting. Original setting of cutters is rigidly maintained without variation.

Submit your threading jobs to us for further important details.

Coulter Automatics

DIAMOND TOOL BORING MACHINES
OPEN-SIDE SHAPER-PLANERS
AUTOMATIC PROFILING MACHINES
AUTOMATIC THREADING LATHES

*Write for details.*

The AUTOMATIC MACHINE CO.
BRIDGEPORT, CONN. U.S.A.

# EASIER AND BETTER FINAL CLEANING

"SPRAY IT ON —DRY IT— BRUSH IT OFF"

The simplicity of the ACP DRY CLEANING PROCESS is well summed up in the phrase "Spray it on—dry it—brush it off."

No. 202 Deoxidine, used in this process, is a creamy liquid of green color, which dries to a loose powder in a 10 to 20 minute trip through the oven. During that time the chemical reactions take place, which remove thin films of oil, rust and acid. When the powder is brushed off, the surface is chemically clean and ideally paint-receptive. Not even an alcohol wipe is needed afterward.

Both time and skill are saved by using the A C P DRY CLEANING PROCESS. It reduces what used to be a skilled and highly responsible operation to a simple factory routine.

Surfaces to be cleaned by the A C P DRY CLEANING PROCESS must be free from heavy rust and oil. That is best accomplished by use of the A C P Rustless Process during fabrication. We are glad to give full data on both processes on request.

## AMERICAN CHEMICAL PAINT CO.

AMBLER PENNA.

Detroit Los Angeles Toronto, Can.

ACP

DRY CLEANING PROCESS


# TORRINGTON BALL BEARINGS

STURDY dependable performance . . . precision machined accuracy . . . Torrington ball bearings have a record of performance in 113 widely different electrical and mechanical products.

There are Torrington Bearings to meet *your* needs. And back of these bearings are the Torrington engineers, to work out your problems with you . . . the engineers of an organization with sixty years' experience in precision manufacture.

DISTRICT SALES REPRESENTATIVES

The TORRINGTON COMPANY
*Curtis Building*
2842 W. Grand Blvd.
Detroit, Mich.

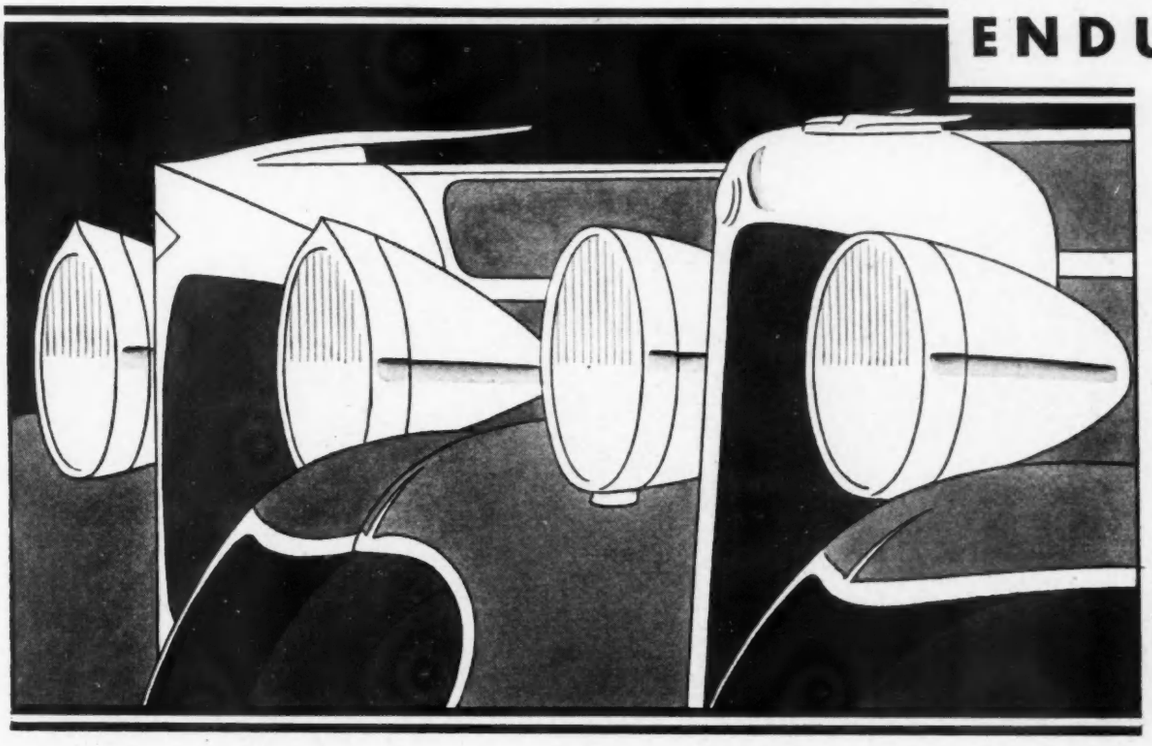
*The Torrington Company*
ESTABLISHED 1866
*Torrington, Conn., U.S.A.*

DISTRICT SALES REPRESENTATIVES

S. W. ANDERSON
565 West Washington Boulevard
Chicago, Ill.

THE ETERNAL LUSTRE OF

# ENDURO



## The New Beauty that is Permanent

Motor cars are achieving a new beauty through the use of Enduro on parts formerly plated . . . a new freedom from constant polishing . . . and an enduring lustre never before attainable. • With its permanent, glistening finish, its complete resistance to rust and corrosion, and a ready adaptability to hundreds of different uses, the field for Enduro has become almost unlimited. • Manufacturers of thousands of commodities where metal is employed can improve the appearance and usefulness of their products . . . and their appeal to the buyer . . . through the proper use of Enduro. • How this remarkable metal can be used to best advantage . . . in meeting your special requirements, will be explained without obligation. A letter will bring a prompt response.

**ENDURO**

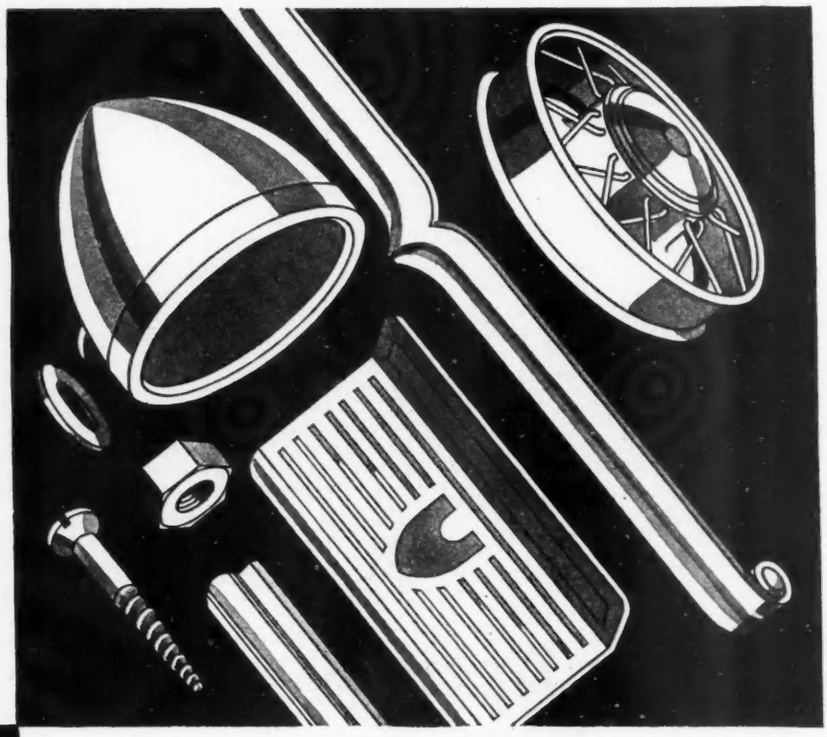
**THE PERFECTED STAINLESS STEEL**

*Central Alloy Division*

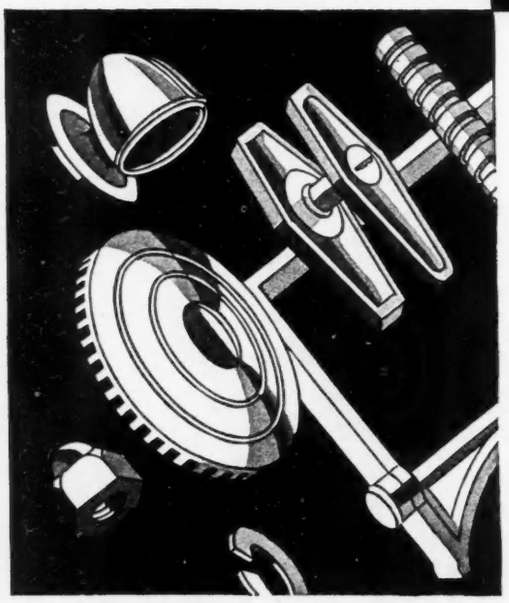
**REPUBLIC STEEL CORPORATION**

**GENERAL OFFICES; YOUNGSTOWN, OHIO**

# *There is a rich beauty in* "STAINLESS TRIM" *that other metals cannot match . . .*



*Stainless will increase the weather and wear resistance of Bumpers, Disc and Wire Wheels, Tire Rims, Hub Caps, Tank Caps, Crank Hole Covers, Bolts, Nuts and Screws, Water Pump Parts, Radiator Shells, Hood and Door Hinges, Cowl Moulding, Mud Guards, Handles, Windshield Brackets and Wipers, Instrument and Running Board Trim.*



Stainless Steel has a look of quality about it . . . and a deep, dark beauty, unequaled in other alloy steels . . . It lends that eye appeal to the better motor car which lifts it out of its price class.

The beautiful lustre of "Stainless" trim with its sharp, modern contrasts will never need polishing or replating to preserve it. It will never acquire that common, "tinny" look . . . Genuine "Stainless" is available in a wide range of physical properties. There is a type to suit every part and every manufacturing process. "Stainless" will soon be the mark of "better cars." Why not use it now while you can register an impression on the market? . . . Write for our booklet "Stainless in Industry" . . . today.

*Genuine* Stainless Steel is manufactured only under the *patents* of

AMERICAN STAINLESS STEEL COMPANY

Commonwealth Building · Pittsburgh, Pennsylvania

# STAINLESS STEEL

# SHULER

## FRONT AXLES

### RESOLUTION

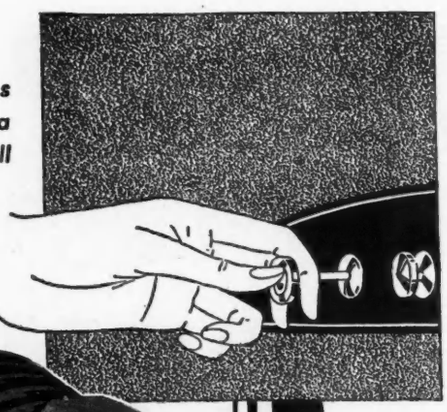
Resolve to change your buying habits for 1931—Purchase front axles on the same basis as tires—not on price alone but on price per ton mile.

On that new leaf you are turning over specify "Shuler".

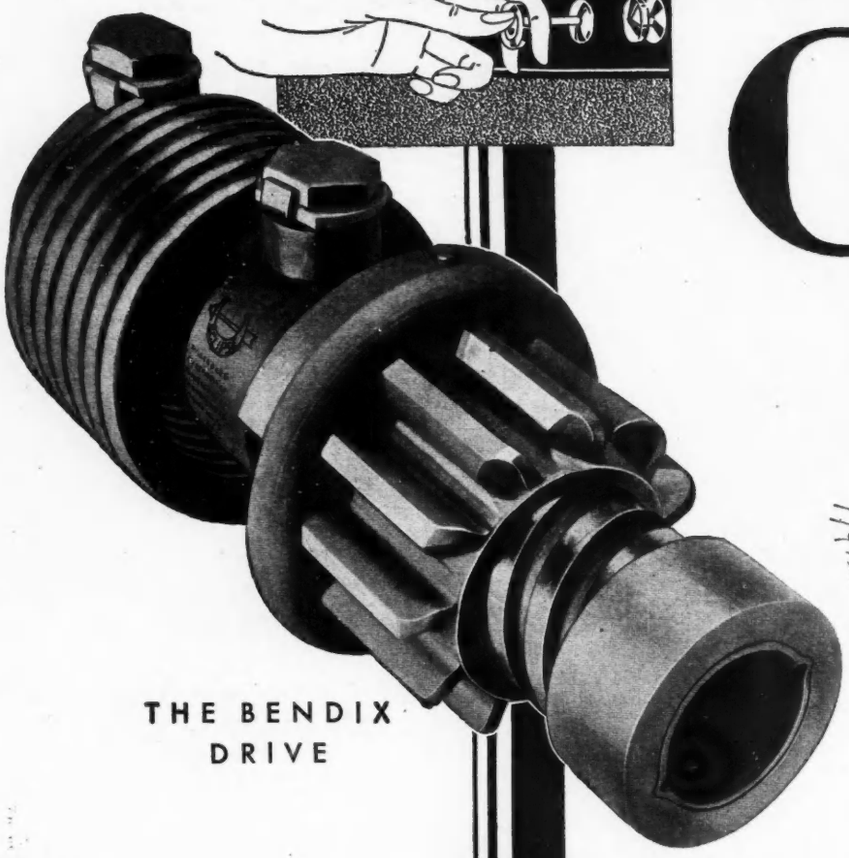
Front Axles Only

SHULER AXLE COMPANY, Inc.
LOUISVILLE, KENTUCKY

*Easy as ringing a door-bell*



# Touch *and* Go



THE BENDIX DRIVE

It's a long step from the old time method of cranking a car by hand to the present day when starting a car is done by simply touching a button located conveniently on the floor or dash.

With so little personal effort, the Bendix Drive takes hold, cranks your engine and lets go when the engine starts—every operation is an automatic one—all set in motion by the mere touch of a button.

Car dealers are demonstrating the convenience and ease of starting when the car is equipped with the Bendix Drive.

ECLIPSE MACHINE COMPANY, Elmira, N. Y.
ECLIPSE MACHINE COMPANY, Limited, Walkerville, Ont.
(DIVISIONS OF BENDIX AVIATION CORPORATION)

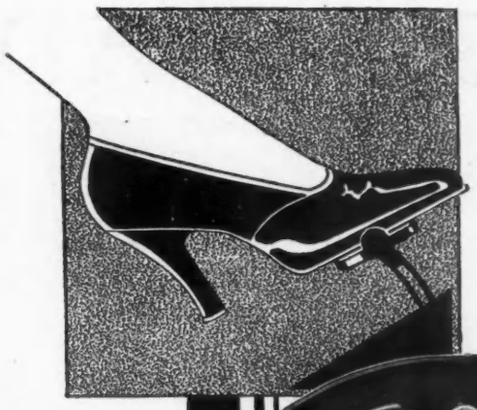
BENDIX
*Automobile and Aviation*
PRODUCTS

Bendix Brakes, Bendix Drive, Eclipse Aircraft Starters and Generators, Stromberg Carburetors, B-K Vacuum Brake Boosters, Aircraft Propellers, Bendix-Westinghouse Air Braking Systems, Marine Instruments, Scintilla Aircraft Magnetos, Delco Aircraft Ignition, Pioneer Instruments, Bendix-Cowdrey Brake Testers, and other equipment.

# BENDIX

AUTOMOBILE

# Press *and* Stop



*Multiplied energy*

THE BENDIX BRAKE

(Fully protected by patents and applications in U.S. and abroad)

For control on hills—for speed with safety or for abrupt emergency stops—Bendix Brakes always answer the pedal pressure uniformly, quickly and positively.

Sturdy construction makes adjustments on Bendix Brakes lasting and performance dependable and uniform.

Foot pressure is increased automatically by the rotation of the wheels, making every stop smooth and effortless.

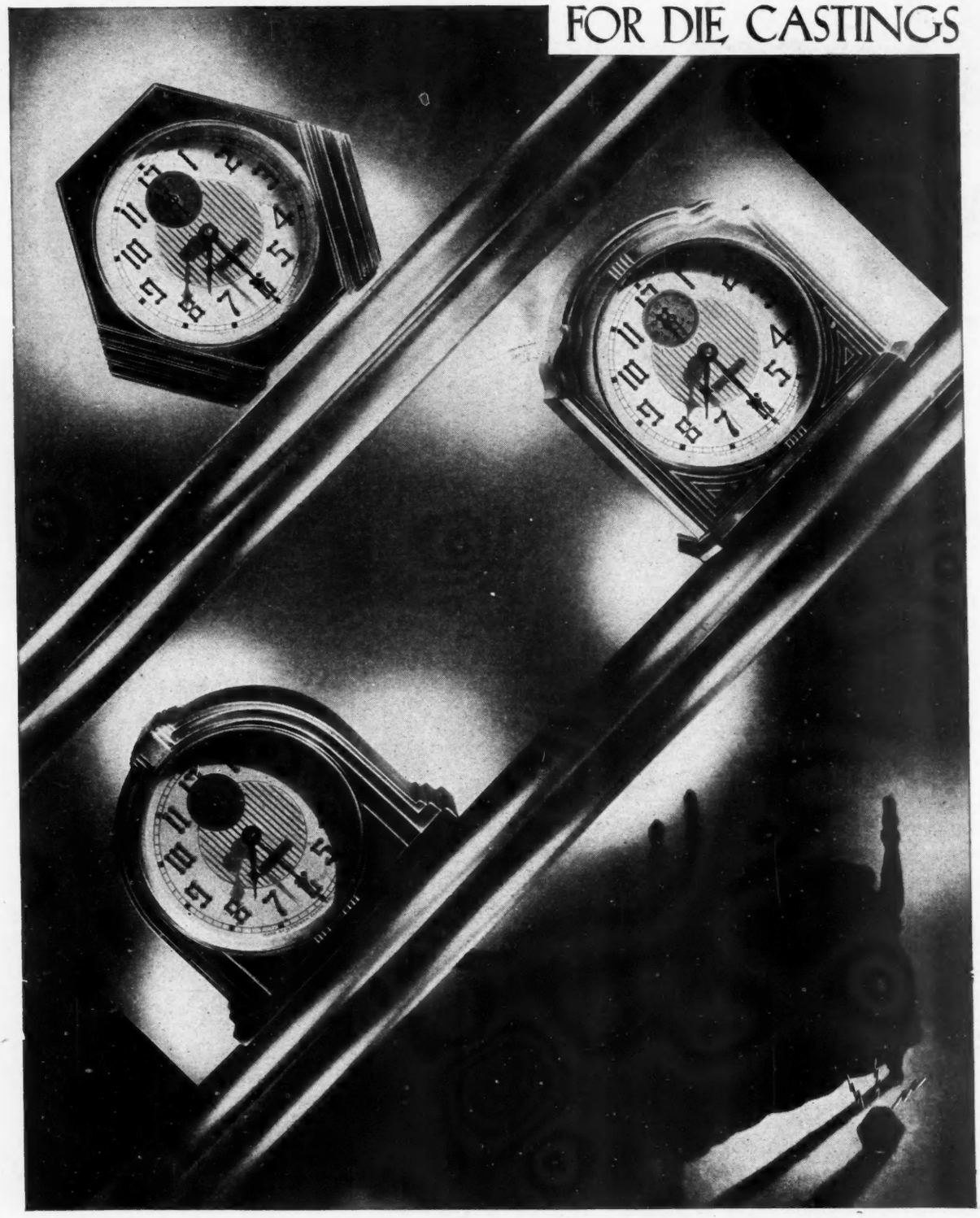
Such positive brakes are convincing in car demonstrations and back up the sales features of speed and control.

BENDIX BRAKE COMPANY
South Bend, Indiana
(DIVISION OF BENDIX AVIATION CORPORATION)

# PRODUCTS and AVIATION

# HORSE HEAD *UNIFORM QUALITY* ZINC

## FOR DIE CASTINGS



New cases for a leading alarm clock, die cast from an alloy of Horse Head Zinc. Butler Silver Finish.

Combining ACCURACY of dimension, FLEXIBILITY of design, BEAUTY of finish, SPEED of production.

---

THE NEW JERSEY ZINC COMPANY

160 FRONT STREET, NEW YORK CITY

*Zinc Metal and Alloys* • *Rolled Zinc* • *Zinc Pigments* • *Sulphuric Acid* • *Spiegeleisen*

# another addition to the Fuller Line ...model "MLU"

## 4 speed transmission for 2½ ton trucks.....

IN keeping with Fuller policy of "making haste slowly" and yet maintaining a leading position in automotive progress, Fuller engineers, over a period of more than 28 years, have worked steadily toward the always advancing objective of building a complete line of heavy-duty transmissions to meet ever-changing requirements.

The most recent addition to this sound, growing line is the Model "MLU" . . . illustrated on this page. This transmission has been specifically designed for 2½ ton truck service. It fulfills, in all details, the demands imposed by this type of operation. It guarantees the truck manufacturer and the truck owner maximum mileage with a minimum of servicing.

*If you now build or contemplate building a 2½-ton Truck, we welcome the opportunity of furnishing more detailed information.*

FULLER & SONS MANUFACTURING CO.
*Division Unit Corporation of America*
BANKERS BUILDING MILWAUKEE, WIS.

**FULLER**
STANDARD AND SPECIAL
**TRANSMISSIONS**

FROM ROUGH BILLET — Fuller — TO FINISHED PRODUCT

**MODEL "MLU"**
**SPECIFICATIONS**

Speeds { 4 forward / 1 reverse
Load Rating: 2½ tons
Chassis Weight: 5,800 lbs.
Engines { 331 cu. in. displacement, 6 cyl. / 300 cu. in. displacement, 4 cyl.
Clutch { 12 facing multiple disc 8" diameter / *Borg and Beck single plate optional*
Brake: 3" x 8" band type

• • •

*Fuller engineers will gladly go anywhere for conference when either standard or special transmissions are being considered.*

# LEADING MANUFACTURERS SUPPLY NICKEL ALLOY STEEL PARTS FOR DAY-ELDER TRUCKS

### *Manufactured by Timken-Detroit Axle Co.*

| | Composition |
|---|---|
| Front axle steering knuckle | SAE 3130 |
| Front axle knuckle pin | SAE 2512 |
| Front axle steering arm | SAE 3130 |
| Front axle steering arm balls | SAE 3120 |
| Rear axle shafts (2) | SAE 3240 |
| Rear axle housing sleeves (2) | SAE 3130 |
| Rear axle worm shafts (2) | SAE 3120 (Approx.) |

### *Manufactured by Ross Gear & Tool Co.*

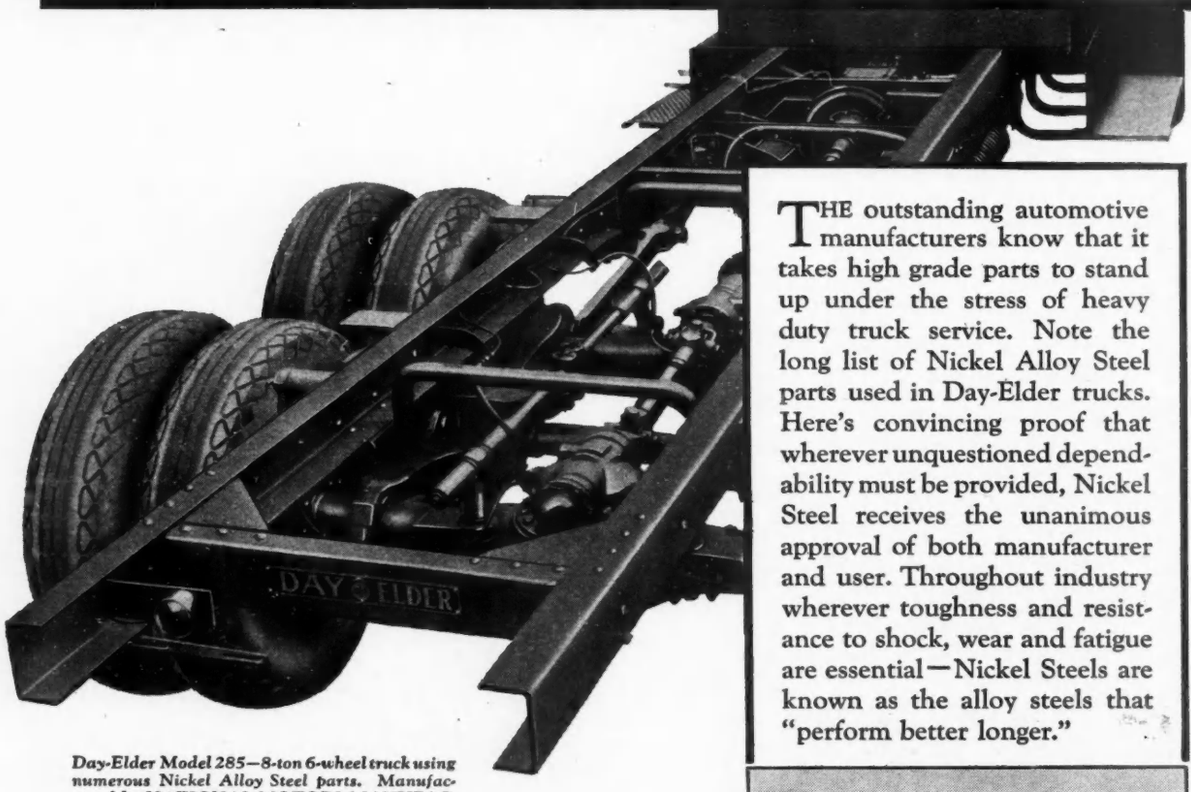
| | Composition |
|---|---|
| Steering gear cross shafts | SAE 3120 |

### *Manufactured by Brown-Lipe Gear Co.*

| | |
|---|---|
| Transmission gears | SAE 2320 |
| Transmission shafts | SAE 2320 |
| Transmission guide rods | SAE 2320 |

### *Engine Parts Manufactured by Continental Motors Corp.*

| | |
|---|---|
| Pump gears | Special Ni. Steel |
| Pump shafts | Ni-Cr. stainless |
| Intake valves | SAE 3140 |
| Connecting rod bolts | SAE 3135 |
| Flywheel bolts | SAE 3135 |
| Main bearing cap screws | SAE 3135 |




*Day-Elder Model 285—8-ton 6-wheel truck using numerous Nickel Alloy Steel parts. Manufactured by NATIONAL MOTORS MANUFACTURING COMPANY, Irvington, New Jersey.*

THE outstanding automotive manufacturers know that it takes high grade parts to stand up under the stress of heavy duty truck service. Note the long list of Nickel Alloy Steel parts used in Day-Elder trucks. Here's convincing proof that wherever unquestioned dependability must be provided, Nickel Steel receives the unanimous approval of both manufacturer and user. Throughout industry wherever toughness and resistance to shock, wear and fatigue are essential—Nickel Steels are known as the alloy steels that "perform better longer."

**Nickel**
**ALLOY STEEL**
PERFORMS BETTER LONGER

THE INTERNATIONAL NICKEL COMPANY, INC.
*Miners, refiners and rollers of Nickel. Sole producers of Monel Metal.*
67 Wall Street New York, N. Y.


*Type "A" for dash installation.*

*Announcing*

The *New*

# HARRISON HOT WATER HEATERS

The Harrison Radiator Corporation, world's largest producer of automobile radiators, is now manufacturing Hot Water Car Heaters for automobile use.

Thorough analysis of heating requirements has resulted in the perfection of two types of heaters to supply the demands of the motoring public. Abundant heat, scientifically distributed throughout the car, plus simplicity of design and installation, combines to insure satisfactory performance.

Harrison Hot Water Heaters are now being distributed to the automotive trade through Branches and Authorized Service Stations of United Motors Service.

HARRISON RADIATOR CORPORATION
LOCKPORT, N. Y.

DISTRIBUTED TO THE TRADE BY

## UNITED MOTORS SERVICE

*Types "D" and "E" for rear compartment and dash installation.*

# The Alloy Crews . . . Guardians of Quality

The alloy crews of Illinois Steel Company have a free hand in selecting the pick of the furnaces. Special mills and the best of everything are available for their use. Sure in their technique, exacting in their demands, the alloy crews are the best assurance of quality in Illinois Alloy Steels.

**Illinois Steel Company**
SUBSIDIARY OF UNITED STATES STEEL CORPORATION
208 South La Salle Street, Chicago, Ill.

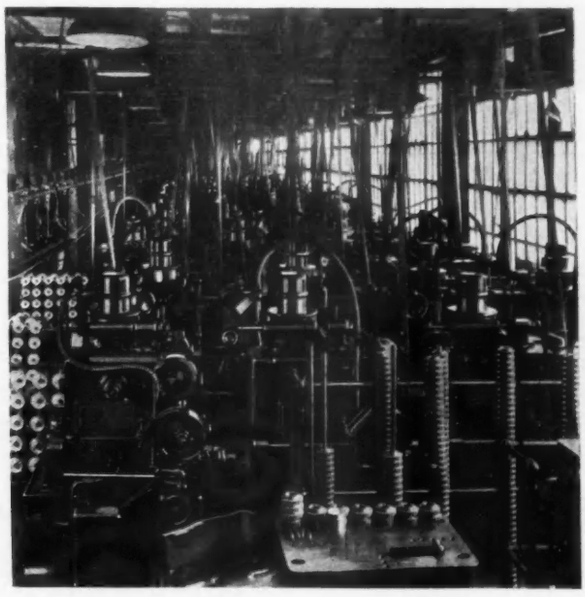
U.S. STEEL

**ILLINOIS *alloy* STEEL**

# 93 *in one Battery*

. . grown from

an initial 5 Machines because of

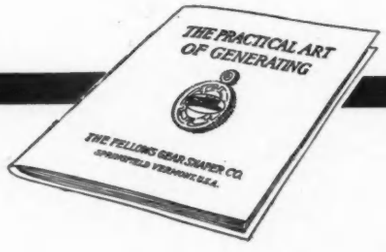


# SERVICE

"We are completely sold on Fellows products," said the manager of this prominent automobile plant. He went on further to state that up until the time they installed Fellows Gear Shapers they did not know what service meant.

Several years ago they decided to build a new line of transmissions and called in the Fellows engineering representatives, telling them what they wanted and asking their advice. All of the drawings for this transmission were turned over to the engineering department at the home plant of the company and recommendations were made including machines for cutting the gears, the types of cutters to use, fixtures, inspection equipment, etc. The manager said that it was in some trepidation that he ordered everything that had been specified, but was now glad he had done so because today they are producing gears at the lowest cost that they have ever done in the history of the company. THE FELLOWS GEAR SHAPER COMPANY, Springfield, Vermont, U. S. A. (Or Detroit Office, 1149 Book Building).

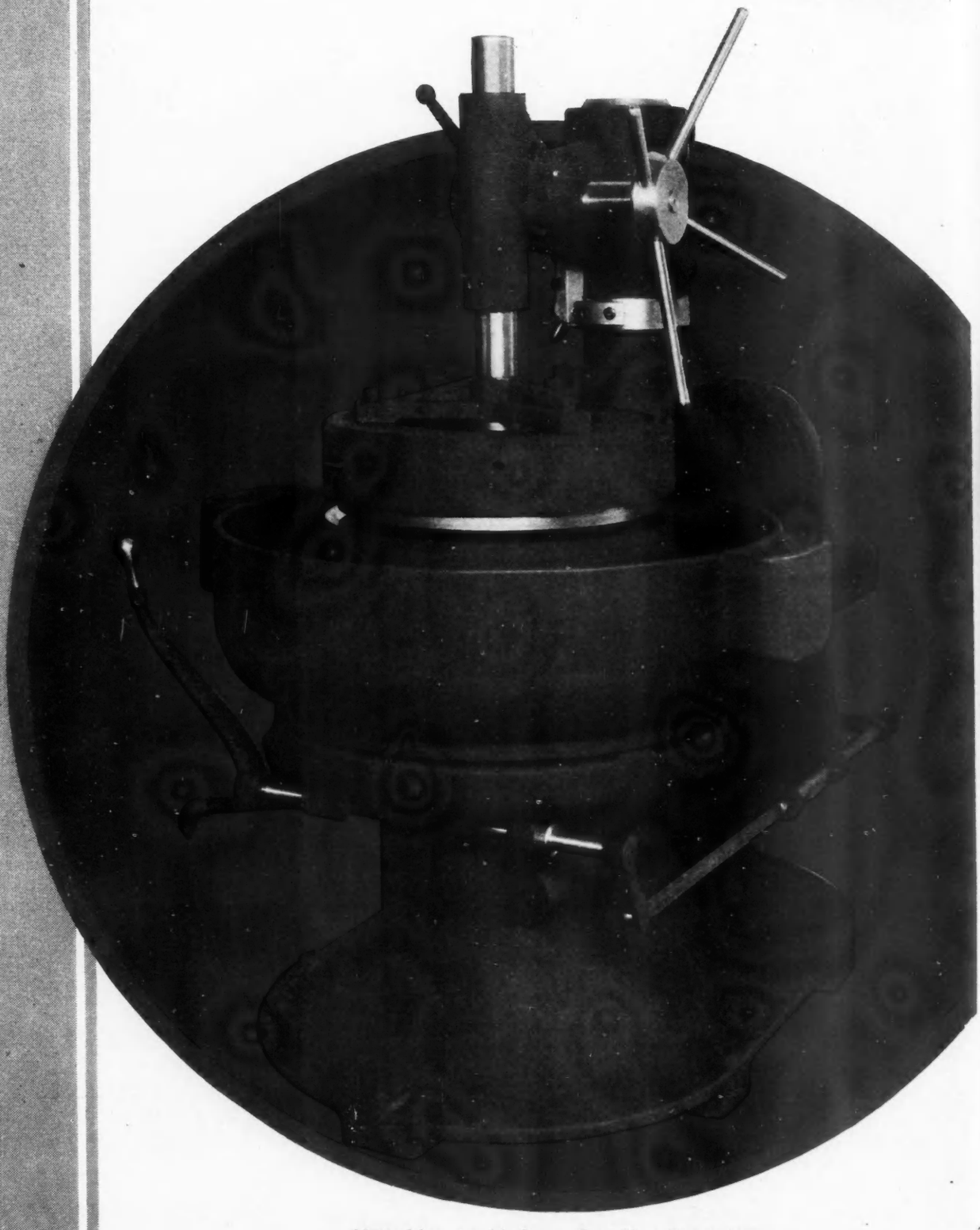
The plant referred to in this, the seventeenth in a series of advertisements, uses nothing but Fellows Gear Shaper products for finishing and inspecting gears. We will be pleased to furnish name upon request.




# FELLOWS *Gear Shapers*

# MECHANICAL

## is now



Vertical Lapping Machine — Type No. 1C and 2C for Cylindrical Work, Type No. 1F and 2F for Flat Work

# LAPPING

## a Standard Machining Operation

**The final finish and accuracy which is demanded on such parts as are shown here can be obtained economically on a manufacturing basis only by**

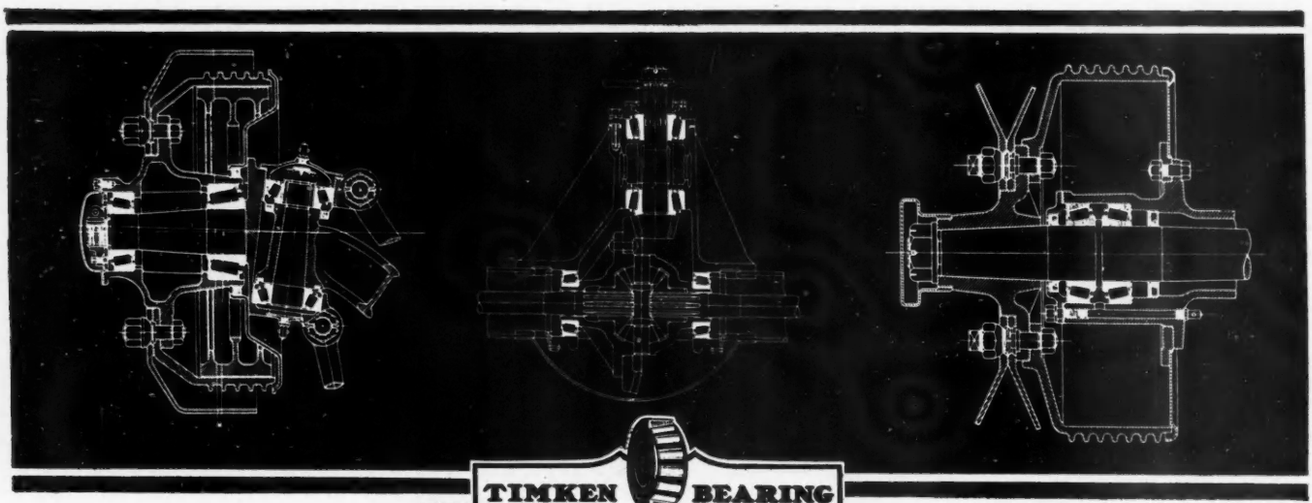
**MACHINE LAPPING**

**Machine Lapped Bearing Surfaces have a minimum of friction and consequently:**

1. **Wear longer without reduction in size.**
2. **Have less risk of seizure.**
3. **Produce less noise in operation.**
4. **Have longer life.**

**NORTON COMPANY**
WORCESTER, MASSACHUSETTS

**NORTON**
**LAPPING MACHINES**




# Protect Those Vital Points With Timkens

Timken versatility is more necessary now than ever—in front and rear wheels; in pinion, differential and steering.

In all of these positions a great deal more than anti-friction efficiency is demanded of the bearings; more than radial load capacity.

THRUST is one additional menace that must be met—and mastered; thrust that is constantly increasing in severity as more and more powerful motors and higher and higher car speeds are introduced.

Maximum stability for wheels and permanent alignment for shafts are other modern necessities demanded of automobile bearings—and found in Timken tapered construction.

In over 30 years of steady motor car development, no other bearing principle that can duplicate Timken performance has been evolved. The Timken Roller Bearing Co., Canton, Ohio.

**TIMKEN** *Tapered Roller* **BEARINGS**


# *New Sparkling Power through*

## ELIMINATION OF OIL-FOG

IN ADDITION to its remarkable efficiency in controlling oil-consumption, the PERFECT CIRCLE "85" *Oil-Regulating* ring also permits the motor to operate at its maximum efficiency by insuring a combustion mixture free from oil-fog.

Everyone knows that an oil-fogged mixture burns slowly, resulting in a sluggish motor. The passage of oil into the combustion chamber is practically eliminated by the "85," and the combustion mixture is kept free from oil-fog.

Combustion is clean, sharp and instantaneous, producing sparkling power and responsiveness.

The PERFECT CIRCLE "85" not only insures maximum oil economy, but by actual test it has a much longer efficient life than other types of oil rings. Truly the "85" is establishing new standards of oil-ring performance.

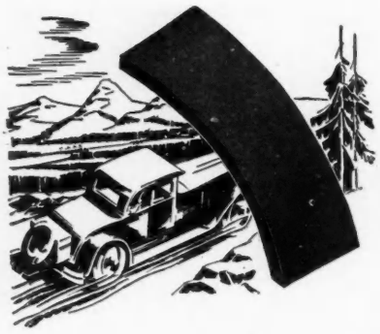
PERFECT CIRCLE engineers welcome the opportunity to assist any manufacturer in the solution of piston ring problems and in working out the correct ring equipment for new models. Samples of the new "85" Oil-Regulating ring will gladly be sent on request.

• • •

***The* PERFECT CIRCLE *Company***
*General Offices:* HAGERSTOWN, INDIANA
*Plants at Hagerstown, Newcastle and Tipton, Indiana*

# PERFECT CIRCLE

**OIL-REGULATING RING** **85** ***with* COMPENSATING CHANNEL**



# stamina!

## FACTS ABOUT ONE OF THE ROAD TESTS THAT PROVED THE QUALITY OF MULTIBESTOS LX

(LATEX BONDED)

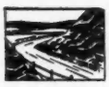
Here are some of the facts based on the reports received from part of the 10,000 mile road test made to supplement the Multibestos L X (Latex Bonded) laboratory tests.

## SUMMARY OF CONDITIONS AND RESULTS

**Brake Lining** Multibestos L X (Latex Bonded) regular stock

**Automobile** A popular make of light car

**Weather** Hot—dry—cool—damp—rainy



**Roads** Concrete—macadam—dirt—muddy—rutted

**Territory** New Hampshire—over White Mountains

## NATURE OF TEST

3100 stops made on mountain grades after acceleration to 45 and 55 m.p.h.
231 stops in rapid succession or as fast as car would accelerate.
2900 stops made in normal city and rural traffic.
3000 stops on hilly roads—car accelerated to 45 and 55 m.p.h.
**9231 stops—total for this portion of the road test.**

## RESULTS . . .

**Multibestos L X (Latex Bonded) shows a very low wear factor—no swelling—drums entirely free from scoring—no adjustments necessary.**

There can be no question as to the ability of Multibestos L X (Latex Bonded) to stand up under ANY driving conditions.
We shall be glad to send to any engineer on request the complete details of this scientifically conceived and laboratory-controlled brake lining.

DETROIT 3-265 General Motors Bldg.
CHICAGO 1233 South Michigan Ave.
GENERAL SALES OFFICES, 235 HARVEY ST., CAMBRIDGE B, MASS.

**MULTIBESTOS COMPANY, WALPOLE, MASS.**


FOR quiet bearing operation it is most essential to have the highest degree of smoothness in a bearing ball.

Strom Smoothness or finish is unequalled!

Placing a Strom ball in the most sensitive type of minimeter (the instrument best used for determining this qualification) will disclose a finish that is truly remarkable.

The world's most accurate registering instruments are used to pass on Strom balls in their final test!

For *quiet* bearings specify Strom balls!

## Strom Steel Ball Co.

1850 So. 54TH AVE., CICERO, ILL.

Philadelphia
Packard Building

Los Angeles
Pacific Nat'l Bank Bldg.

# On Your Program of Advertising for 1931

Schedule Adequate Space in

## The Annual Statistical Issue

of

## AUTOMOTIVE INDUSTRIES

To be Published February 28th

This issue is the industry's year-round reference book of basic engineering, marketing and production data. It offers twelve months daily advertising value at regular rates. Write for information on insert requirements, color printing prices and special positions to

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Business Manager

AUTOMOTIVE INDUSTRIES

A CHILTON CLASS JOURNAL PUBLICATION

Chestnut & 56th Sts., Philadelphia, Pa.


# THREE YEARS AGO?...NO!

## BUT NOW THESE PARTS CAN BE MADE OF STAINLESS

HERE'S proof of the splendid workability of Carpenter Stainless Steel No. 5—the stainless that machines, grinds and polishes as easily as ordinary screw stock. Look at these carburetor parts. They must be capable of very exacting adjustment—they must be absolutely impervious to corrosive action. And now the easy workability of Carpenter No. 5 insures the first requirement—the inherent stainlessness of this fine steel guarantees the second.*

Results such as these were impossible only two or three years ago—no stainless steel was then available that could be machined or ground without considerable material loss and destruction to tools and temper.

This condition completely changed when Carpenter Stainless Steel No. 5 was brought out—the first stainless to have the necessary qualities for economical and satisfactory quantity production of all machined parts such as these.

No matter what your experience with stainless steel in the past—get samples of our No. 5 and try them on your own machines, at regular speed, under regular conditions. See how easily you can get stainless qualities in your product at a cost which is frequently no higher than the same part made of ordinary steel, plus the cost of plating.

*Approved by Underwriters' Laboratories.

**THE CARPENTER STEEL COMPANY, Reading, Pa.**

*Licensees Under Patents of American Stainless Steel Co.*

SMALL, UNSEEN, but vitally important carburetor parts, formerly made of ordinary steel, are now being made of stainless—Carpenter No. 5.

# Easy to make good mouldings from this STAINLESS STEEL!

HUNDREDS of manufacturers who once undertook the manufacture of stainless mouldings or stampings and gave it up as a bad job are now successfully and profitably making these same products from Carpenter Stainless Strip. There are two good reasons for this.

1. Stainless Strip Steel from the Carpenter mill is characterized by a uniform dead softness—freedom from hard spots—and possessed of a satin smooth finish free from surface imperfection. The soft temper permits of deep drawing, bending or forming without expensive annealing and pickling operations. The finish is such that many parts can be simply buffed without any polishing operation—or in some cases tumbled to a beautiful permanent lustre.

2. Carpenter representatives are equipped with an enormous fund of valuable information regarding tooling, drawing compounds, polishing and buffing procedures, etc., which takes all of the uncertainty out of the fabrication of properly made Stainless Strip. This specific knowledge has been responsible for converting many a near failure into profitable commercial production.

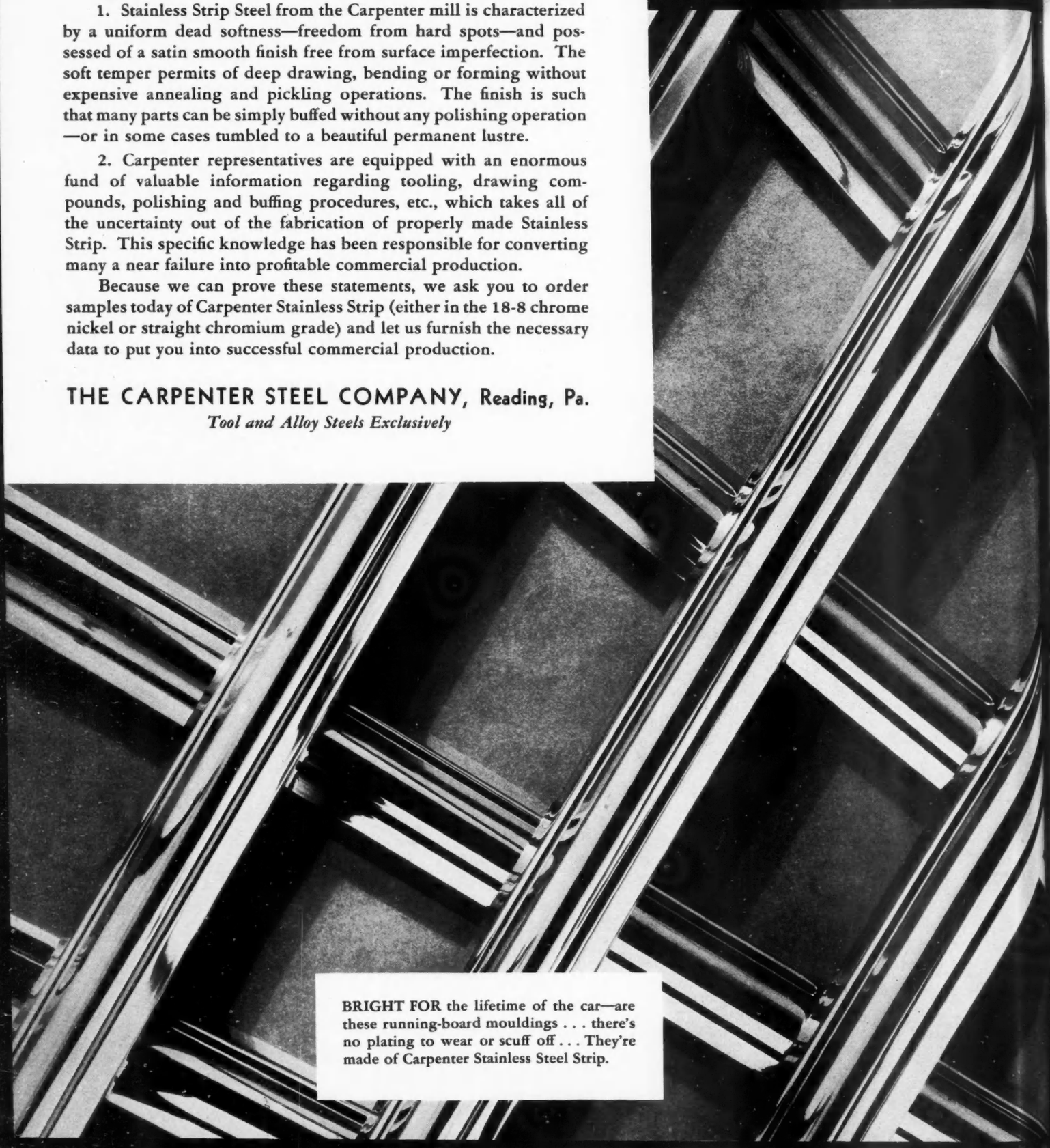
Because we can prove these statements, we ask you to order samples today of Carpenter Stainless Strip (either in the 18-8 chrome nickel or straight chromium grade) and let us furnish the necessary data to put you into successful commercial production.

**THE CARPENTER STEEL COMPANY, Reading, Pa.**

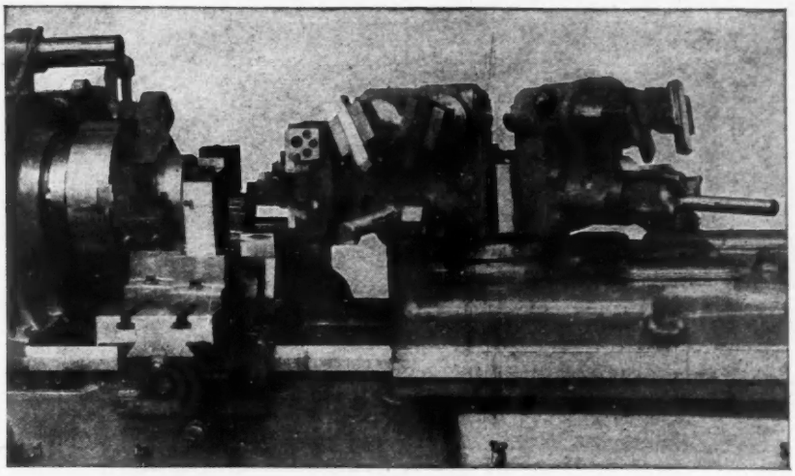
*Tool and Alloy Steels Exclusively*

*Carpenter*

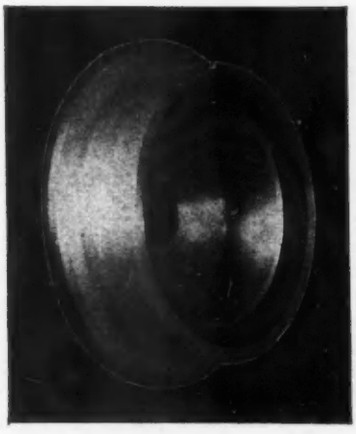
STAINLESS STEEL



BRIGHT FOR the lifetime of the car—are these running-board mouldings . . . there's no plating to wear or scuff off . . . They're made of Carpenter Stainless Steel Strip.



# 29 EVERY SIXTY MINUTES



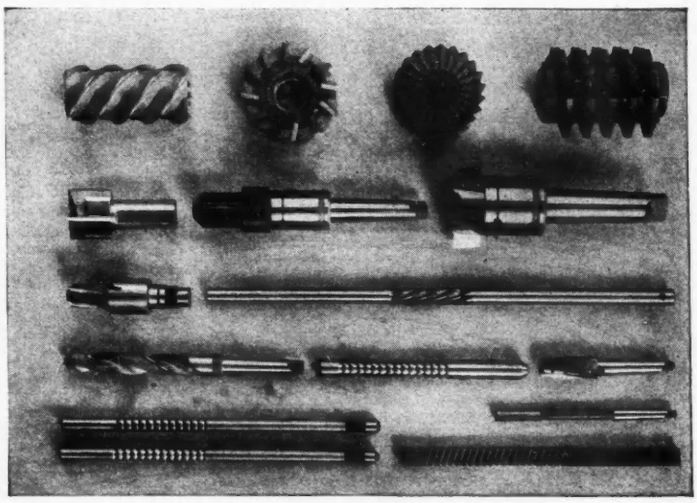
**An output of 29 pieces per hour, from one operator handling a battery of four P & J 5-D POWER-FLEX Automatics, is obtained on this job. ¶ The subjects are gripped on the rim as you will note from the view of the machine above, and the following cuts taken:—**

**Drill, Bore, Ream and chamfer hole**
**Rough and finish bevel flange**
**Rough and finish bore large hole**
**Rough and finish face bottom**
**Rough and finish turn and face track side of roller**
**Chamfer corners**
**Rough and finish face end of track side of roller**

**A substantial saving in production costs is being accomplished over the former method. ¶ P & J Automatics are making tremendous cuts in production costs in many of the large plants throughout the world. It may be that we can reduce your costs. Just send in your prints for full particulars.**

## POTTER & JOHNSTON MACHINE COMPANY

PAWTUCKET, R. I.



# L-XX HIGH SPEED STEEL

L-XX represents the highest development in a high speed steel for general all-around work. The true value of this master high speed steel can be measured in terms of speed, feed, and cut as applied to modern machine tools.

L-XX is a modern development in high speed steel for the most advanced machine shop practice. Its superiority is clearly demonstrated on the first trials. Uniformity is one of its chief characteristics.

L-XX is especially recommended for turning, boring, planing, slotting and shaping tools, twist drills, milling cutters of all kinds, gear cutters, taps, reamers, punches, and dies and, in short, for any purpose where high speed steel can be used.

It is carried in stock in all standard bar sizes.

**Let us send you the Ludlum Tool Steel Catalog giving applications and treatments for the entire Ludlum line.**

# LUDLUM

LUDLUM STEEL COMPANY
TOOL AND SPECIAL ALLOY STEELS

WATERVLIET AND DUNKIRK, N. Y.
NIROSTA, NITRALLOY & STRAUSS METAL

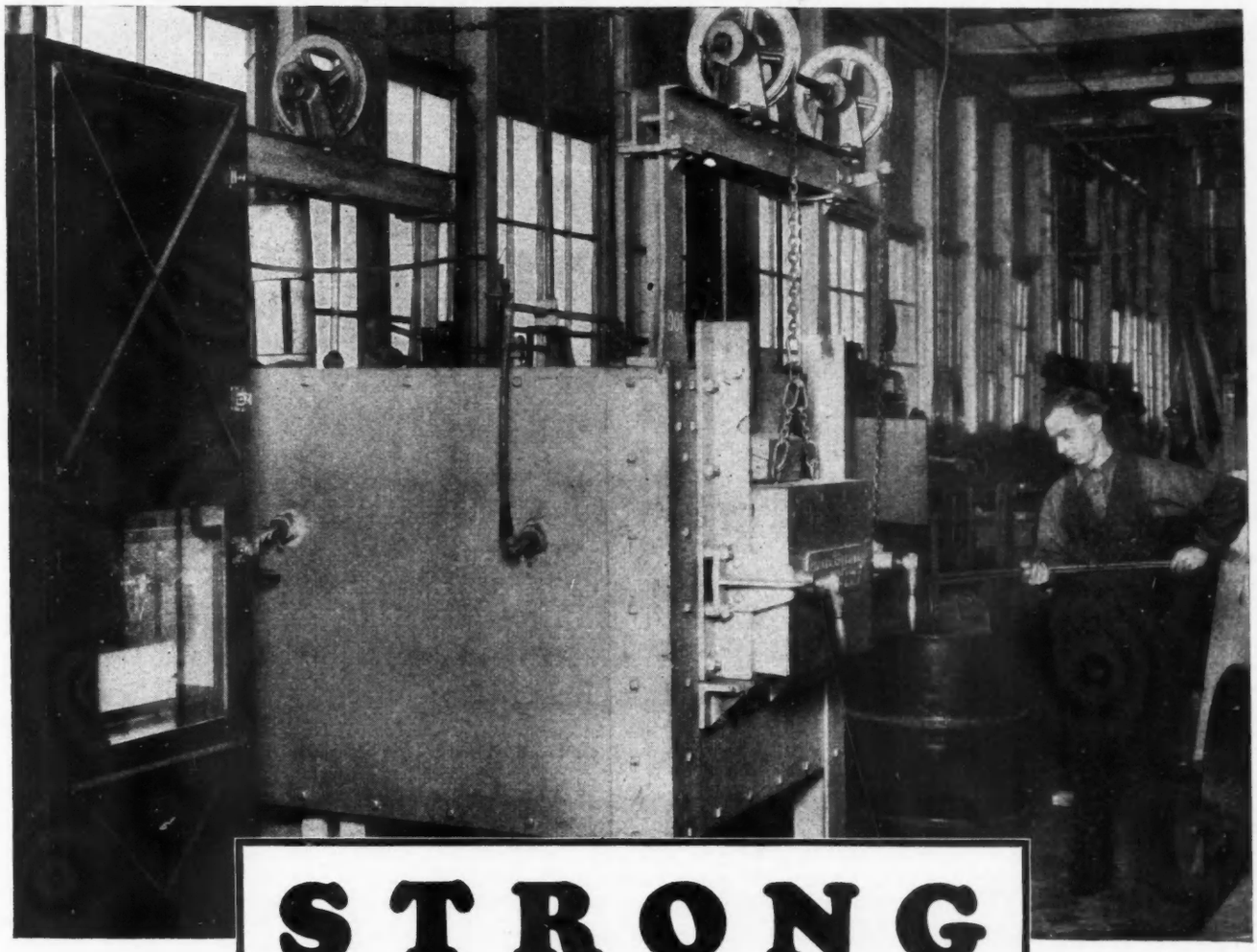
4885

# Electric oven for duralumin

DURALUMIN rivets for use in fabrication of duralumin structural parts of military and commercial airplanes built by the Great Lakes Aircraft Corporation are heat treated in this S C & H electric oven-type furnace.

*Due to the peculiar ability of duralumin to "age" rapidly—duralumin parts heated to 940° to 950° Fahr. attaining a Rockwell hardness of 90° 24 hours after removal from the heat—the rivets are heat treated in small baskets and delivered fresh from the furnace quench to workmen every 20 minutes to avoid "aging" before they can be worked.*

*Strong, Carlisle & Hammond* Engineers design, build and install electric, oil and gas-fired furnaces for every industrial use. Call them in when your heat treating facilities are to be considered and the problem seems difficult.

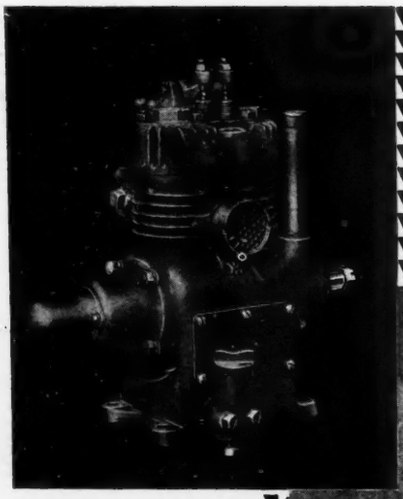


**STRONG CARLISLE & HAMMOND**

*SC&H Furnaces are made for annealing, case hardening, carburizing, forging, cyaniding, lead hardening, oil tempering.*

*SC&H Furnaces are built in all sizes of Oven, Pot, Continuous, and Special Types for Electric, Oil or Gas application.*

INDUSTRIAL FURNACE MANUFACTURERS · CLEVELAND, OHIO



*The Heart of the Air Brake, this sturdily constructed compressor is designed for long, unflinching service. It furnishes a pneumatic force for the operation of brakes, air horns and other requirements of the modern motor vehicle.*

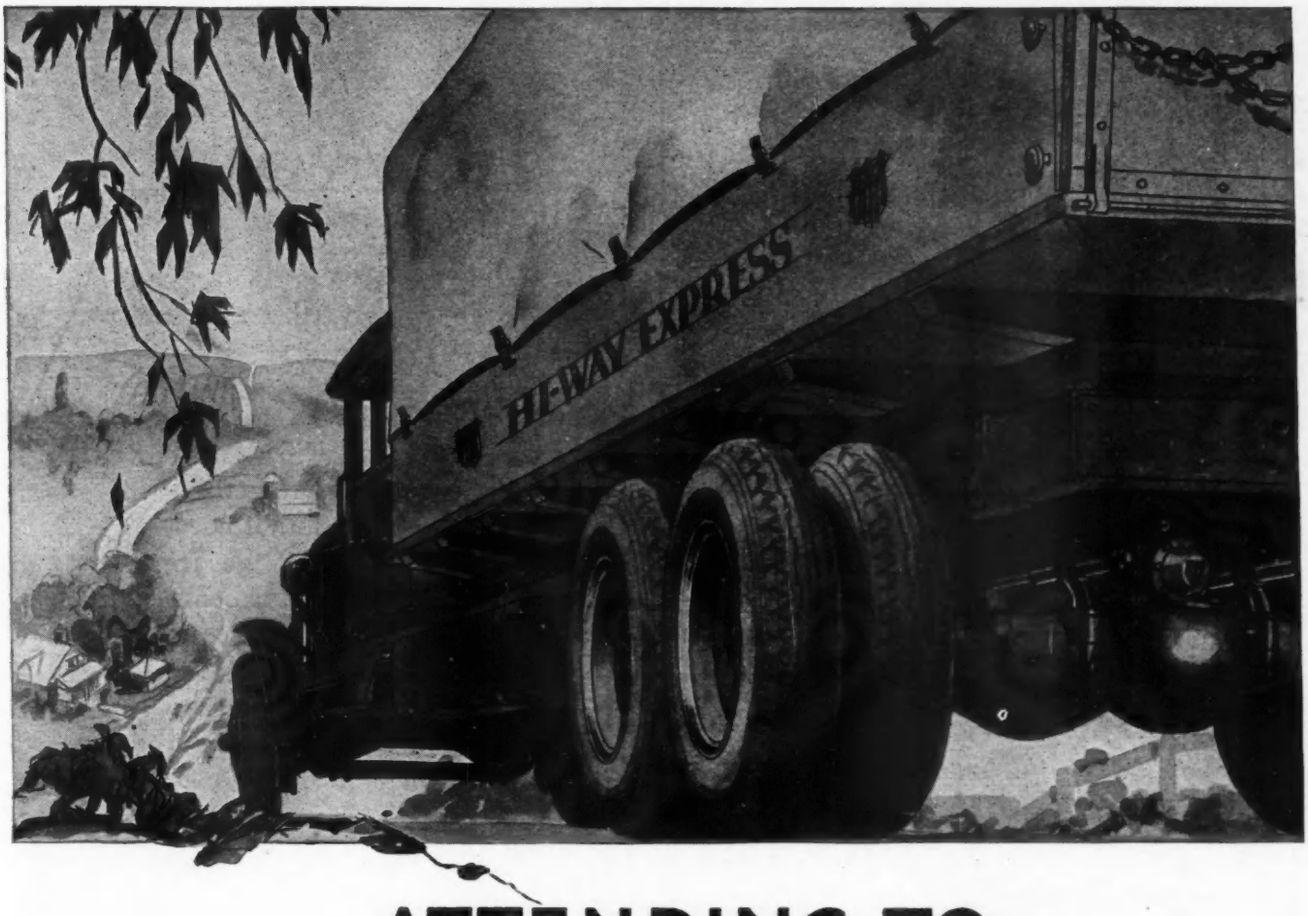
# There is no substitute for *skill* in manufacture

Skill in manufacture . . . born of sixty-one years experience in the production of safety devices which must not fail . . . is more than a tradition in producing Bendix-Westinghouse Automotive Air Brakes. A thousand trained hands . . . keen eyes . . . take up the work where intricate machinery and careful design leave off. Each unit of today's most dependable braking system is designed and made to function with watch-like precision—which is perhaps the best reason why Bendix-Westinghouse Brakes are looked upon, by the world, as today's most dependable stopping force. A letter addressed to BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE CO., at Pittsburgh, Penna., will bring any information you may desire regarding power brake control for all types of heavy duty highway transport vehicles.

0284

# BENDIX WESTINGHOUSE

## AUTOMOTIVE AIR BRAKES




# ATTENDING TO BUSINESS—*QUIETLY*

You admire men who are workmanlike; no fuss, no playing to galleries; just attending quietly to business.

You find that admirable quality in the Timken Six Wheel Unit. Its performance typifies the motor truck's job—to haul merchandise and material quickly, cheaply; to *keep working.*

Bigger capacities, extra traction, added brake control, perfect flexibility, added to the traditional workmanlike efficiency, ruggedness, and dead silence of Timken Worm Drive: that is the Timken Six Wheel Unit; always attending to business—*quietly.*

THE TIMKEN-DETROIT AXLE COMPANY, DETROIT, MICHIGAN

**TIMKEN SIX WHEEL UNIT**

# NIAGARA

## DOUBLE CRANK PRESSES

### *are Odds-on Favorites*

with producers of automotive stampings and others to whom fast production, economy of operation and accuracy of work are factors of prime importance.

There is a wide selection of Niagara double crank and other presses. Allow our engineers to assist you in determining the press that will give the production capacity and ease of control for your work.

***Write for Bulletins on All Types of Presses***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# LOADED

THERE are few now who want to sell us something which we do not need. Knowing this, we are not so prone as once all humans were to throw up a barricade — a Chinese Wall — against all forms of selling effort.

Today the alert executive listens willingly and reads wisely to acquire quickly a maximum of useful information directly pertinent to his business. His alertness prompts and requires a careful scanning of the advertising pages of the business paper which serves his industry.

The advertising pages of Automotive Industries are loaded with information which has direct, definite and up-to-the-minute value for you and your company.

UBP
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# BODY NOISES AND VIBRATION REDUCED WITH

## *Pressed* FELT

*at a low cost*

The automobile buyer of today demands that body squeaks and rattles be reduced to an absolute minimum. Pressed Felt is the material which is particularly adapted for this type of work. It is pliable, conforms to any desired shape; retains its "life" and resiliency longer than other materials and will not deteriorate even under the most extreme conditions. Its low cost justifies its use.

The Felters Company manufactures a complete line of Pressed Felts for deadening sound and reducing vibration. These Felts may be furnished cut to your exact specifications or in rolls. For samples, suggestions and further information write nearest branch.

★ ★ ★ ★

*Felt covered Window Channels wear longer, provide a snug fit without "binding" and make a better cushion for the glass. For the best results specify FELTERS Channel Felts*

**The FELTERS Co., Inc.**

*Manufacturers of Felts*

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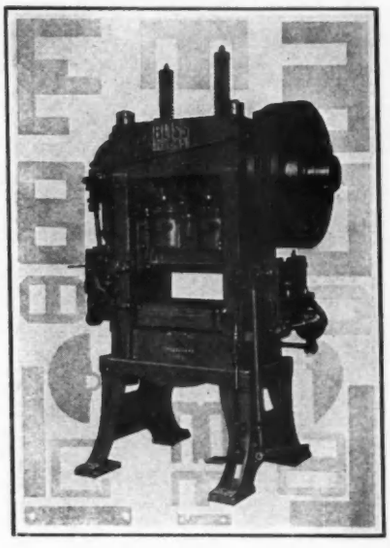
MILLS: MILLBURY, MASS., JACKSON, MICH., MIDDLEVILLE, N. Y., JOHNSON CITY, N. Y.



## For Your Laminations — The "Bliss" High Speed Double Eccentric Press!



You can now get from stock a standard high production press with ample room for long follow dies for radio, motor and power transformer laminations,—a rugged, accurate press that operates at 200 to 300 strokes per minute!

Built in three sizes of 20, 45 and 75-ton ratings, these new double eccentric shaft machines were logical additions to the line of "Bliss" High Production Presses.

You can use these machines for most any large-quantity job requiring progressive dies and get speedy production, long die life, silent operation, and low costs!

Write and tell us where we may send you a copy of our new catalogue section, P-6 Sup. A, describing this new line.

**E. W. BLISS CO., BROOKLYN, N. Y., U. S. A.**

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Sales Offices: DETROIT CLEVELAND CHICAGO ROCHESTER PHILADELPHIA CINCINNATI NEW HAVEN BOSTON

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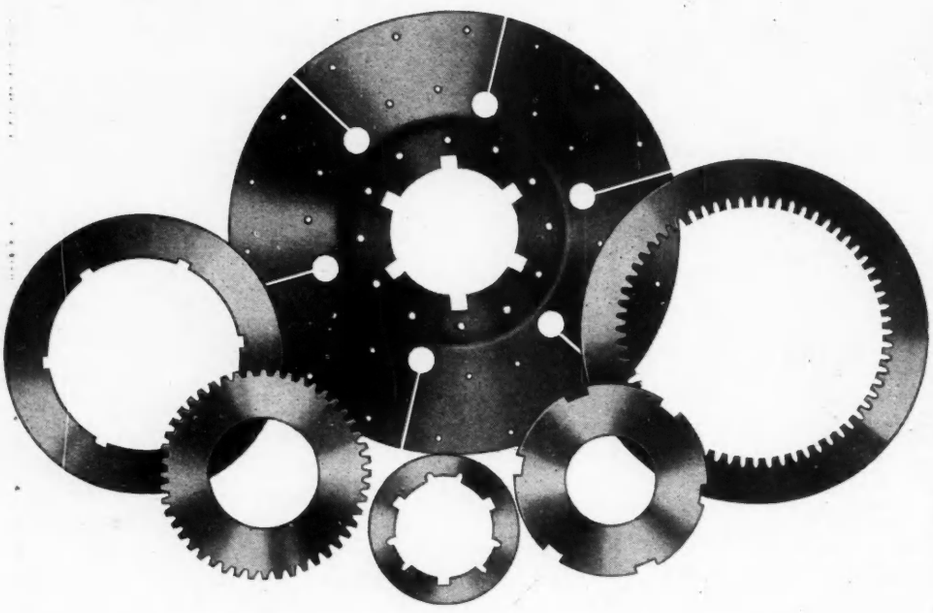
**BLISS**

# CURTIS CLUTCH DISCS



Only long experience in the manufacture of Clutch Discs can tell a manufacturer what is necessary for satisfactory performance in automobile, truck or tractor service.

This company has concentrated its efforts for years on the manufacture of custom-built Clutch Discs of precision. The result of that skilled experience shows in the perfection of its finished product.

And because of solving so many perplexing problems in this field, the Curtis Company is particularly qualified to give expert advice as to your particular needs. Correspondence is invited.

Curtis Clutch Disc Co.
Division of Curtis Manufacturing Company
1917 Kienlen Ave.
St. Louis, Mo.

CURTIS Clutch Discs are furnished in high carbon, alloy or mild steel, also non-ferrous metals, plain or slotted, flat or formed, unfinished or ground and polished, tempered or untempered, any size.

# NORMITE STEEL SHEETS

For Fenders, Radiator Shells and all Body Parts.

For Difficult Stamping Operations of All Kinds

EASTERN STEEL NORMITE SHEETS

Save with Steel

THE EASTERN ROLLING MILL COMPANY
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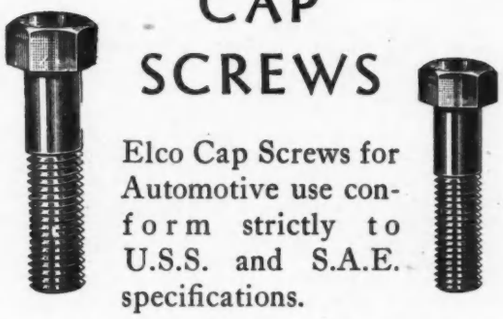
# ELCO
## CAP SCREWS



Elco Cap Screws for Automotive use conform strictly to U.S.S. and S.A.E. specifications.

Accurately threaded and with uniform heads they will speed your assembly operations.

*Write for prices and samples today.*

**ELCO**

TOOL & SCREW CORP.

1806 Broadway

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*Cut Your Costs*

*By the use of Die Cast Parts*

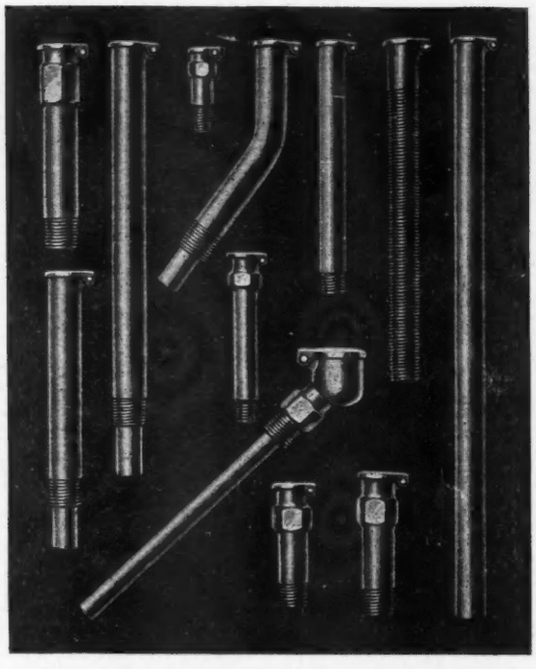
Illustrated here are only a few castings where substantial savings have been effected, due to partial, and in some cases, total elimination of costly machining operations. Castings made from Aluminum, Zinc, Lead and Tin Base metals, alloyed to suit your particular requirements.

*Send Blue Prints or Samples for Quotations*

DIE CASTING DIVISION

*Barnhart Brothers & Spindler*

*Monroe and Throop Streets, Chicago*



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**Gits Clutch Oilers, Chassis Oilers and Industrial Oilers are made in 400 styles and sizes. Ask for our latest catalog.**

GITS BROS. MFG. CO.

1846 SOUTH KILBOURN CHICAGO

SCIENTIFIC MATHER SPRINGS

**Everybody who knows Mather Springs has a good word for them.**

**THE MATHER SPRING CO., TOLEDO, OHIO**

*Manufacturers of Scientifically Heat Treated Automobile Springs*

# HOLCROFT & COMPANY

BUILT BY HOLCROFT & COMPANY DETROIT-MICH.

LEADERS IN BUILDING AND DESIGNING ELECTRIC AND COMBUSTION FURNACES, KILNS AND OVENS
HOME OFFICE, DETROIT. BRANCHES: CHICAGO, PHILADELPHIA.
CANADA: HIRAM WALKER & SON., METAL PRODUCTS, LTD., WALKERVILLE, ONT.

INVESTIGATE ELECTRIC HEAT

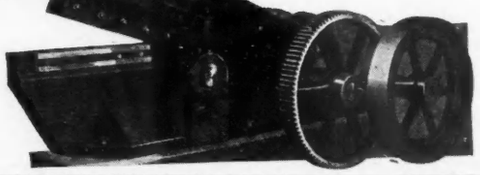
# CUT YOUR SCRAP

## Get $3.00 to $5.00 More Per Ton

Ford, Briggs, Budd, etc., use the Canton All Steel, Double Geared Shear. Handles any shape soft iron or steel from 1" up to 4½", round or square. Write for catalog.

CANTON

CANTON FOUNDRY & MACHINE CO.
Canton, Ohio



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## HORIZONTAL DRILLING and BORING MACHINES

For increased production. Oilgear feed. Automatic. Indexing table. Specification sheets. Performance records upon request.

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## ONE OR MORE OF THESE PAMPHLETS

If you are concerned in the manufacture or inspection of tools, jigs, fixtures, gears, gages, or accurate metal parts of any description:

No. 352-B, Universal Measuring Machines
No. 398, Printing Chronograph
No. 417-A, Precision Screw Cutting Lathes
No. 437-A, Measuring Instruments
No. 458, Gear Testing Machines
No. 472, Bench Micrometers
No. 479, Comparators for Photographic Plates
No. 508, Linear and Circular Dividing Machines
No. 506, The Micro-Indicator
No. 552, The Micro-Indicator Stand
No. 546, Jig Boring Machines

THE R. Y. FERNER COMPANY
Agents for Societe Genevoise
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FOR CLOSING CORE HOLES

## COILED and FLAT SPRINGS

PHOSPHOR BRONZE SPRINGS A SPECIALTY

## SMALL STAMPINGS

WASHERS and SPRING COTTERS

## WIRE SHAPES

## M. D. HUBBARD SPRING CO.

620 SOUTH BLVD. PONTIAC, MICHIGAN

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Steam Drop Hammers - Board Drop Hammers
Single and Double Frame Forging Hammers
Trimming Presses - Tool Dressing Hammers

ERIE FOUNDRY CO., Erie, Pa.

GUARANTEED USED

# ELECTRIC DYNAMOMETERS

LABORATORY, CHASSIS and BLOCK TEST TYPE
WE ALSO PURCHASE USED MACHINES

## MID-WEST ENGINEERING WORKS

Western Avenue at 62nd Street CHICAGO, ILL.

# AUTOMOTIVE INDUSTRIES

Is read in 93% of all car plants
92% of all motor truck plants

Which include the plants producing 98% of $3,425,000,000 worth of motor cars, trucks and buses sold yearly. A great market for machine tool equipment.

AUTOMOTIVE AEROPLANE MISCELLANEOUS

PITTSBURGH FORGINGS CO.

CORAOPOLIS PENNA.

QUALITY SERVICE WORKMANSHIP

DETROIT OFFICE GEN'L MOTORS BLDG.

CARBON & ALLOY DROP OR UPSET FORGINGS

# MULLINS STAMPINGS

Quality, Service, Price.
Established 1873

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332 So. Mich. Ave., Chicago. Gen. Motors Bldg., Detroit.

*In Cleveland and Pittsburgh districts.*

**Dayton**
**The Mark of a Good Wheel**
World's largest truck makers use Dayton Steel Wheels. Specify Dayton Single and Dual Pneumatic Steel Wheels on your trucks and buses.
THE DAYTON STEEL FOUNDRY CO., DAYTON, O.

**LINK-BELT**
**Automotive Silent Chain**
*Quiet - Durable - Efficient*
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**FIRTH-STERLING**
**STAINLESS *and* TOOL STEELS**
FIRTH-STERLING STEEL COMPANY
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NEW STEWART-WARNER **FUEL PUMP**
Materially Reduces Priming Time
Our Engineers Are at Your Service
STEWART-WARNER CORPORATION
CHICAGO, ILLINOIS

**DeVilbiss**
***Spray-*** PAINTING FINISHING ***System***
THE DEVILBISS COMPANY TOLEDO, OHIO

**CHAMBERSBURG-NATIONAL**
COMPLETE FORGING EQUIPMENT
CHAMBERSBURG ENGINEERING CO. CHAMBERSBURG, PA.
THE NATIONAL MACHINERY CO. TIFFIN, OHIO
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**BLISS & LAUGHLIN, Inc.**
COLD DRAWN STEELS and SHAFTING
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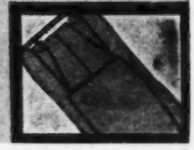

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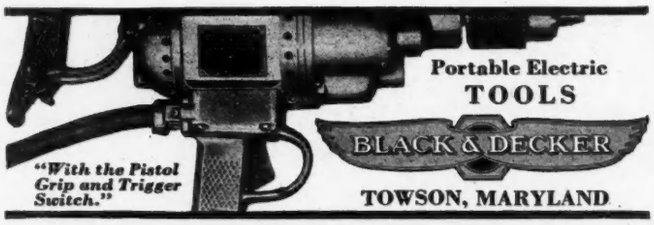
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See Alphabetical List of Advertisers on Second and Third Following Pages

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*Sulphuric*
New Jersey Zinc Co.

**Air Cleaners**
Handy Governor Corp.
United Air Cleaner Co.

**Alloys**
*Ferro*
International Nickel Co.
New Jersey Zinc Co.
*Non-Ferrous*
Aluminum Co. of America
International Nickel Co.
New Jersey Zinc Co.

**Anti-Freeze Solution**
National Carbon Co.

**Arms & Knuckles, Steering**
Canton Forge & Axle Co.

**Axles**
Canton Forge & Axle Co.
Eaton Axle & Spring Co.
Park Drop Forge Co.
Shuler Axle Co., Inc.
Timken-Detroit Axle Co.

**Balls, Steel**
Strom Steel Ball Co.

**Bearings, Anti-Friction**
*Ball*
Aetna Ball Bearing Mfg. Co.
Gurney Ball Bearing Div. (Marlin Rockwell Corp.)
Torrington Co.
*Roller*
Timken Roller Bearing Co.

**Benches, Steel**
Angle Steel Stool Co.

**Bending & Straightening Machines**
Chambersburg Engineering Co.
Chambersburg-National Co.
Cleveland Punch & Shear Works Co.
National Machinery Co.

**Blanks**
*Forged*
Bethlehem Steel Co.

**Blowers**
Kirk & Blum Mfg. Co.

**Blow-Pipes, Sheet Metal**
Kirk & Blum Mfg. Co.

**Bodies**
Budd Mfg. Co., E. G.
Mullins Mfg. Corp.

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Atlas Bolt & Screw Co.
National Acme Co.
Russell, Burdsall & Ward Bolt & Nut Co.

**Boring Machines**
Bullard Co. (Mills)
Foote-Burt Co.
Rockford Drilling Machine Co.

**Brake Bands**
Konigslow Mfg. Co., Otto

**Brake Drums**
Bossert Corp.
Erie Malleable Iron Co.
Holley Permanent Mold Machine Co., Inc.

**Brake Lining**
Multibestos Co.

**Brakes**
*Air*
Bendix - Westinghouse Automotive Air Brake Co.
*Mechanical*
Bendix Brake Co.
Eclipse Machine Co.

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Wolverine Tube Co.

**Brass Specialties**
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**Bulldozers**
Ajax Mfg. Co.

**Bumpers**
Bossert Corp.
Eaton Axle & Spring Co.
Stewart Warner Corp.

**Bushings**
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Continental - Diamond Fibre Co.
*Steel*
Danly Machine Specialties, Inc.

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*Steel*
Angle Steel Stool Co.

**Carburetors**
Kingston Products Corp.
Marvel Carburetor Co.

**Castings**
*Aluminum*
Aluminum Co. of America
Kingston Products Corp.
*Bronze*
Kingston Products Corp.
*Die*
Barnhart Bros. & Spindler
*Malleable*
Erie Malleable Iron Co.
Link-Belt Co.
Timken Roller Bearing Co.
*Steel*
Link-Belt Co.

**Chains**
*Front End*
Link-Belt Co.

**Chairs, Steel**
Angle Steel Stool Co.

**Channels for Glass**
*Felt*
American Felt Co.
Felters Co., Inc.
Western Felt Works

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Heald Machine Co.

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Danly Machine Specialties, Inc.

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National Acme Co.

**Cleaners, Metal**
Ford Co., J. B.
*Rust Preventive*
American Chemical Paint Co.

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Waltham Watch Co.

**Clutches**
Rockford Drilling Machine Co.

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Kingston Products Corp

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Bendix - Westinghouse Automotive Air Brake Co.

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Canton Forge & Axle Co.
Park Drop Forge Co.
Wyman-Gordon

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Link-Belt Co.

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*Pipe & Tubing*
Dole Valve Co.

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Acklin Stamping Co.
Bossert Corp.

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*Portable*
Canton Foundry & Machine Co.

**Crankshafts**
Canton Forge & Axle Co.
Park Drop Forge Co.
Wyman-Gordon

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Gits Bros. Mfg. Co.
Link-Belt Co.

**Cutters**
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Brown & Sharpe Mfg. Co.
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Fellows Gear Shaper Co. (Gear)

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Marquette Tool & Mfg. Co.

**Die Heads**
National Acme Co.

**Die Sets**
Danly Machine Specialties, Inc.

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Niagara Machine & Tool Works

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Bossert Corp.
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Foote-Burt Co.
Greenlee Bros & Co. (Multiple Spindle)
Rockford Drilling Machine Co.

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Black & Decker Mfg. Co. (Electric)

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Kirk & Blum Mfg. Co.

**Dynamometers**
Mid-West Engineering Works

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Armitage & Co., Jno. L.
Bakelite Corp.

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Buda Co.
Continental Motors Corp.

**Felt**
American Felt Co.
Felters Co., Inc.
Western Felt Works

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Motors Metal Corp.
Mullins Mfg. Corp.

**Fibre Rods, Sheets, Tubes**
Continental - Diamond Fibre Co.

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*Oil*
Handy Governor Corp.

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Mengel Co.

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Canton Forge & Axle Co.
Park Drop Forge Co.
Pittsburgh Forgings Co.
Wyman-Gordon

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Ames Co., B. C.
Danly Machine Specialties, Inc.
Federal Products Co.
Ferner Co., R. Y.

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*Felt*
American Felt Co.
Felters Co., Inc.
Western Felt Works

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Fellows Gear Shaper Co. (Shapers)

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Continental - Diamond Fibre Co.

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*Timing, Metallic*
Canton Forge & Axle Co.
Link-Belt Co.
*Timing, Non-Metallic*
Continental - Diamond Fibre Co.

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Kingston Products Corp.

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Black & Decker Mfg. Co. (Electric)
LeBlond Machine Tool Co., R. K.

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Brown & Sharpe Mfg. Co.
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Cincinnati Grinders, Inc.
Fellows Gear Shaper Co.
Foote-Burt Co.
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Landis Tool Co.
LeBlond Machine Tool Co., R. K.
Norton Company
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Heald Machine Co.
*Surface*
Bryant Chucking Grinder Co.
Heald Machine Co.
Norton Company
*Tool*
Cincinnati Grinders, Inc.
LeBlond Machine Tool Co., R. K.
*Universal*
Landis Tool Co.
Norton Company
*Valve Seat*
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Foote-Burt Co.

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Norton Company

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Chambersburg-National Co.
Erie Foundry Co.
National Machinery Co.

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Mitchell Specialty Co.

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Stewart-Warner Corp.

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**Hobbing Machines**
Barber-Colman Co.

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Brown & Sharpe Mfg. Co.

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Canton Foundry & Machine Co. (Portable)

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**Horns**
Stewart-Warner Corp.

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Konigslow Mfg. Co., Otto

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*(Radiator and Fuel Lines)*
Titeflex Metal Hose Co.

**Housing, Axle**
Bossert Corp.

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Ferner Co., R. Y.

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Davis Keyseater Co.

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Amer. Cyanamid Co. (Rezyl Lacquer Constituent)
Armitage & Co., Jno. L.

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Delta Electric Co.

**Lapping Machines**
Norton Company

**Laps**
Danly Machine Specialties, Inc.

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LeBlond Mach. Tool Co., R. K.
Sundstrand Machine Tool Co.
*Automatic Chucking*
Bullard Co.
*Axle Turning*
Seneca Falls Mach. Co.
*Crankshaft Turning*
LeBlond Machine Tool Co., R. K.
*Multiple Spindle*
Bullard Co.
*Turret*
Potter & Johnston Machine Tool Co.
*Vertical Turret*
Bullard Co.

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Delta Electric Co.
*Vehicle*
Delta Electric Co.

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*Ignition*
Mitchell Specialty Co.

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Bijur Lubricating Corp.

**Lubricators**
*Chassis*
Gits Bros. Mfg. Co.

**Lugs**
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**Lumber, Dimension**
Mengel Co.

**Machine Work (General)**
Konigslow Mfg. Co., Otto

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Automatic Machine Co.
Brown & Sharpe Mfg. Co.
LeBlond Machine Tool Co., R. K.
Rockford Drilling Machine Co.
Sundstrand Machine Tool Co.
*Universal*
LeBlond Machine Tool Co., R. K.

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Stewart - Warner Corp.

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Bakelite Corp.
Continental - Diamond Fibre Co.

**Motors, Electric Power**
Wagner Electric Co.

**Nickel**
International Nickel Co.

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*Baking, Paint & Lacquer*
Kirk & Blum Mfg. Co.
*Core*
Holcroft & Co.

**Packing, Plastic, Metallic**
Conneaut Packing Co.

**Pads**
*Felt*
American Felt Co.
Felters Co., Inc.
Western Felt Works

**Paints**
Aluminum Co. of Amer.
Armitage & Co., Jno. L.
*Heat Resisting*
American Chemical Paint Co.

**Parts, Wood Body**
Mengel Co.

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Danly Machine Specialties, Inc.

**Piston Pins**
Ottawa Steel Prod., Inc.

**Piston Rings**
Perfect Circle Co.

**Pistons**
Aluminum Co. of Amer.

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Hubbard Spring Co., M. D.

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Chambersburg-National Co.
Cleveland Punch & Shear Works Co.
Erie Foundry Co.
Ferracute Machine Co.
National Machinery Co.
Niagara Machine & Tool Works

**Primers, Gasoline**
Dole Valve Co.

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*Fuel*
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*Lubricating*
Cleveland Steel Products Corp.

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Ferracute Machine Co.
Niagara Machine & Tool Works

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**Radiators**
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**Reamers, Sharpeners**
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Russell, Burdsall & Ward Bolt & Nut Co.

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Ottawa Steel Prod., Inc.

**Rolling Mills**
Bliss Co., E. W.

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*Metal*
Motors Metal Corp.
*Wood*
Mengel Co.

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Greenlee Bros. & Co.
National Acme Co.
Potter & Johnston Machine Tool Co.

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National Acme Co.
Strong, Carlisle & Hammond Co.
*Drive*
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Parker-Kalon Corp.
*Hollow*
Strong, Carlisle & Hammond Co.
*Machine*
The Atlas Bolt & Screw Co.
Elco Tool & Screw Corp.
National Acme Co.
*Self-Tapping*
Parker-Kalon Corp.
*Set*
The Atlas Bolt & Screw Co.
National Acme Co.
Shimer, Samuel J., & Sons
Strong, Carlisle & Hammond Co.
*Sheet Metal*
Parker-Kalon Corp.
*Wood*
Elco Tool & Screw Corp.

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Pittsburgh Steel Prods. Co. (Propeller)

**Shafts, Distributor Arm**
Ottawa Steel Prod., Inc.

**Shafts, Fan, Pump & Rocker Arm**
Ottawa Steel Prod., Inc.

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Automatic Machine Co.

**Shears**
Bliss Co., E. W.
Canton Foundry & Machine Co.
Cleveland Punch & Shear Works Co.
Ferracute Machine Co.
Niagara Machine & Tool Works

**Sheet Metal Machines**
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Cleveland Punch & Shear Works Co.
Ferracute Machine Co.
Niagara Machine & Tool Works

**Shims**
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**Shock Absorbers**
Stewart - Warner Corp.

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Cleveland Automatic Machine Co.
Greenlee Bros & Co.

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Waltham Watch Co.

**Spoke Nipples**
Torrington Co.

**Spray Booths**
Kirk & Blum Mfg. Co.

**Spray Painting & Lacquering Equipment**
DeVilbiss Co.

**Springs**
*Flat & Spiral*
American Spring & Mfg. Co.
Hubbard Spring Co., M. D.
*Leaf*
Eaton Axle & Spring Co.
Mather Spring Co.

**Stampings**
Acklin Stamping Co.
Akron-Selle Co.
Bossert Corp.
Hubbard Spring Co., M. D.
Indiana Pressed Steel Co.
Kirk & Blum Mfg. Co.
Konigslow Mfg. Co., Otto
Lansing Stamping Co.
Mitchell Specialty Co.
Motor Wheel Corp.
Motors Metal Corp.
Mullins Mfg. Corp.

**Starter Drives**
Bendix Brake Co.
Eclipse Machine Co.

**Steel**
*Alloy*
Carpenter Steel Co.
Firth-Sterling Steel Co.
Illinois Steel Co.
Ludlum Steel Co.
Republic Steel Corp.
Timken Roller Bear. Co.
*Bars*
Illinois Steel Co.
Republic Steel Corp.
Timken Roller Bear. Co.
*Billets*
Illinois Steel Co.
Timken Roller Bear. Co.
*Carbon*
Bethlehem Steel Co.
Carpenter Steel Co.
Firth-Sterling Steel Co.
Illinois Steel Co.
Republic Steel Corp.
Timken Roller Bear. Co.
*Cold Drawn*
Bliss & Laughlin, Inc.
Republic Steel Corp.
*Electric Furnace*
Bethlehem Steel Co.
Carpenter Steel Co.
Timken Roller Bear. Co.
*High Speed*
Bethlehem Steel Co.
Carpenter Steel Co.
Firth-Sterling Steel Co.
Ludlum Steel Co.
*Shapes*
Illinois Steel Co.
*Sheets*
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Eastern Rolling Mill Co.
Seneca Iron & Steel Co.
*Stainless*
American Stainless Steel Co.
Bethlehem Steel Co.
Carpenter Steel Co.
Firth-Sterling Steel Co.
Republic Steel Corp.
*Strip*
Carpenter Steel Co.
Republic Steel Corp.
*Tool*
Carpenter Steel Co.
Firth-Sterling Steel Co.
Ludlum Steel Co.
Timken Roller Bear. Co.

**Steering Knuckle Pins**
Ottawa Steel Prod., Inc.

**Steering Wheels**
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Angle Steel Stool Co.

**Switches, Stop Signal**
Delta Electric Co.

**Tables, Steel**
Angle Steel Stool Co.

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Ferner Co., R. Y.

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Fellows Gear Shaper Co.

**Threading Machines**
Automatic Machine Co. (Automatic)

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Globe Steel Tubes Co.
Pittsburgh Steel Prods. Co.

**Tubing**
*Flexible Metal*
Titeflex Metal Hose Co.
Wolverine Tube Co.
*Steel*
Globe Steel Tubes Co.
Pittsburgh Steel Prods. Co.

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Canton Foundry & Machine Co.

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Bullard Co.

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Motor Wheel Corp.

**Wicks, Felt**
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Felters Co., Inc.
Western Felt Works

**Wire Forms**
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Forms any size with the fingers.

No matter what kind of steel is used in the shaft, it needs to be kept sealed from the start to keep scale and grit out from the bearings.

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Conneaut, Ohio


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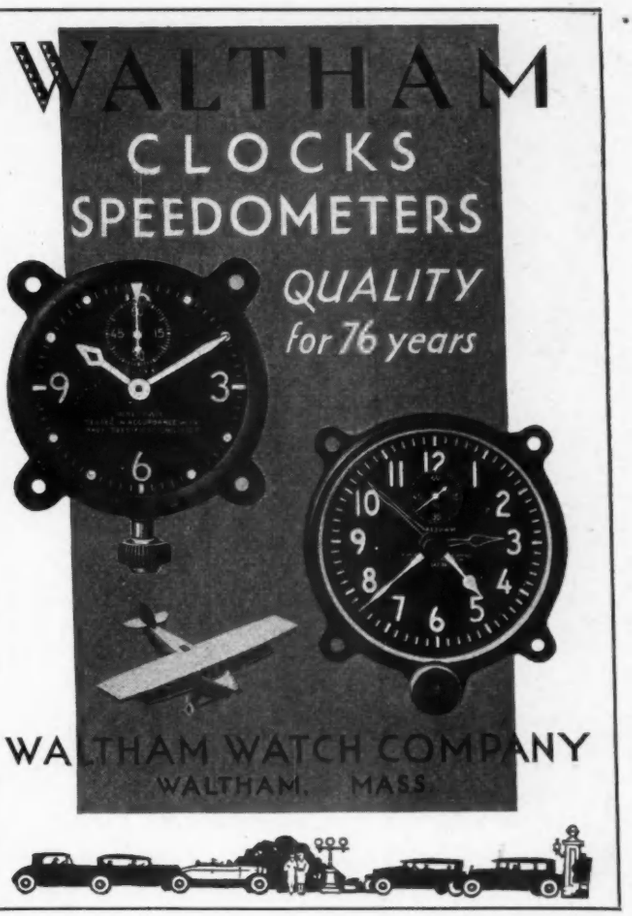
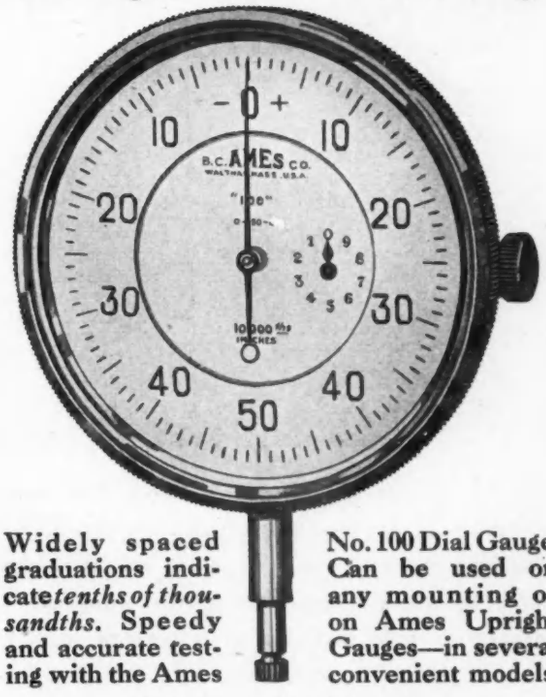



## An Eye for Accuracy

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**WALTHAM, MASS.**
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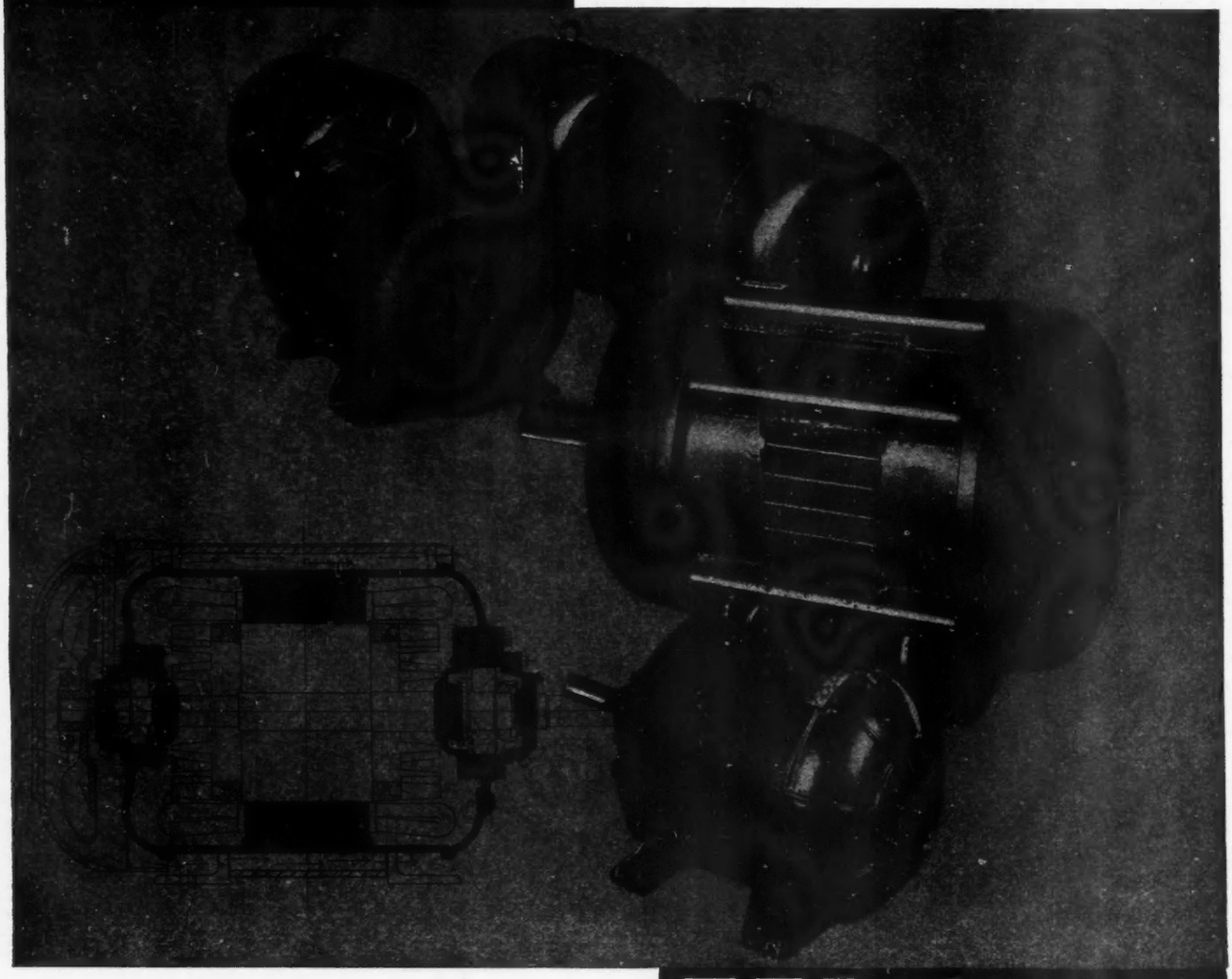
# Eliminate motor shutdowns

In automotive industries, especially, is uninterrupted motor operation of paramount importance. » » » That is why Wagner type CP air-jacketed motors are preferred by the leading automotive production engineers, particularly for machines which must keep going whatever the atmospheric conditions may be. » » » For Wagner CP air-jacketed motors are so built that nothing obstructive or injurious can find its way into the motor in sufficient quantity to require frequent removal. As the cross-section drawing illustrates (in this case showing one of the smaller sizes), these CP motors are provided with two frames, an outer frame which



guides a strong cooling draft over the motor, and an inner frame with clearances around the shaft only, clearances thru which nothing obstructive or injurious can get into the motor because of seals and grease packing. On larger sizes, a fan is provided at each end, the air exhausted around the periphery of the stator, as illustrated by the larger motors in the accompanying picture. » » » These Wagner CP air-jacketed motors, so indispensible for the elimination of frequent motor shutdowns and the lowering of expensive motor maintenance, are fully described in a new edition of Wagner Bulletin 151, copy of which will be sent upon request.

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**Electric Corporation**
6400 Plymouth Avenue, Saint Louis, U. S. A.

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Engineering Library

News of the Industry Begins Page 953

DEC 29 1930

# AUTOMOTIVE INDUSTRIES

LAND AIR WATER

Volume 63
Number 26

PUBLISHED WEEKLY AT CHESTNUT AND 56TH STREETS
PHILADELPHIA, DECEMBER 27, 1930

35c a copy
$3.00 a year


**TOPPING STYLE**—in the Salon or on the street—notice what is going on in wheel fashions. The style is wheels of wood; not the old type, but new in striping—a studied decorative influence in the swanky fender-well mountings; smaller diameters producing that low-to-the-ground look—such is the new vogue as Motor Wheel long ago foretold it—fore-sold it and again demonstrated its well-earned right to leadership.

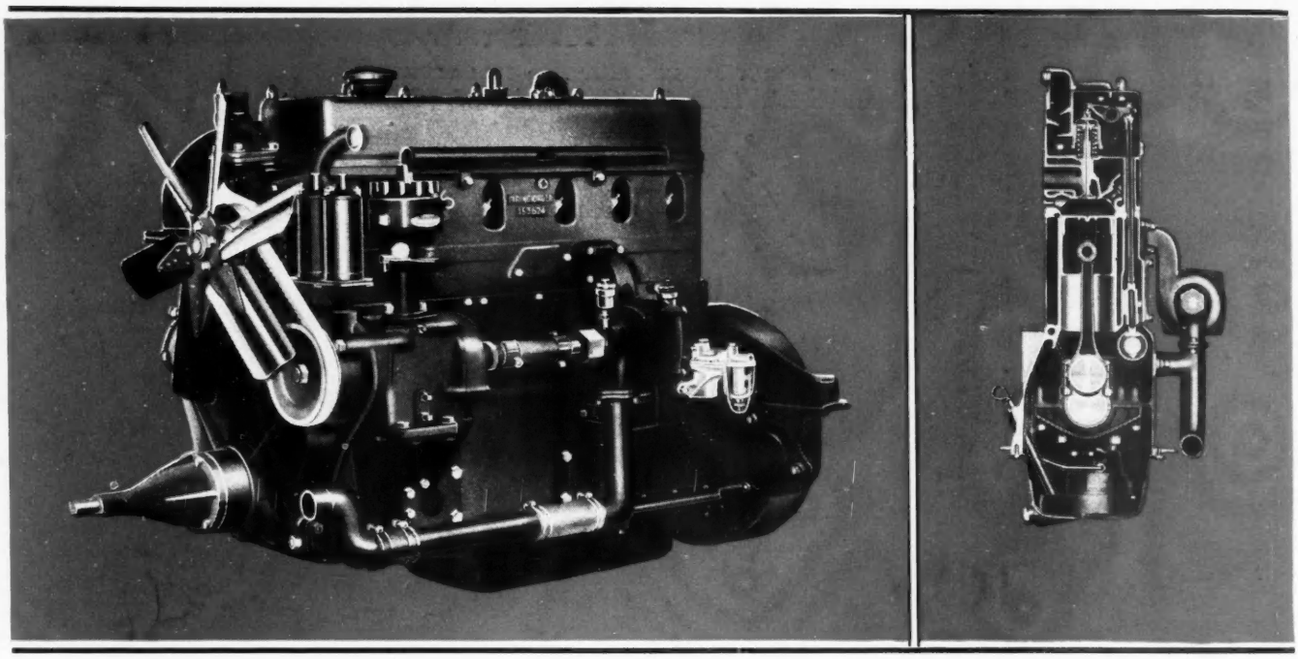
MOTOR WHEEL CORPORATION, LANSING, MICH.

WOOD · WIRE · STEEL
Interchangeable on One Hub

Motor Wheel


Entered as second-class matter Oct. 1, 1925, at the post office at Philadelphia, Pa., under the Act of March 3, 1879

# Built *for* Power
## *and* LONG LIFE



● Side view of Continental "R" 6-cylinder engine. The "R" overhead-valve series range from 73 to 100 horsepower.

● Cross section showing overhead valves with double springs and the rugged bridge truss, nickel iron bearing cap held rigid to crankcase by four bolts instead of conventional two. Center main bearing held by six bolts.

**CONTINENTAL ENGINES are built with mechanical refinements designed to provide maximum efficiency of operation and length of life. They are built to withstand rough usage—with a surplus of power to take care of overloading.**

**Sturdy, well-balanced crankshafts guarantee smoothness — pressure-feed lubrication system provides constant oiling of all moving parts — valves, camshaft, bearings and all integral parts are perfectly machined.**

**Continental builds an engine for every power requirement in the automotive — industrial — agricultural — airplane and marine fields. Continental offers the most efficient, the most economic answer to both manufacturer and consumer power demands. Specify Continental.**

CONTINENTAL MOTORS CORPORATION
*Offices:* Detroit, Michigan, U. S. A.
*Factories:* Detroit and Muskegon
*The Largest Exclusive Gasoline Motor Manufacturer in the World*

# Continental Engines


First Convict:—"Well, so long, Swifty. Don't take any wooden nickels and lay off them ELECTROLOCKED cars."

Swifty:—"You can betcha' life I'm goin' to lay off them. You don't think I wanna land in a dump like this again, do ya? Besides, there's plenty of swell jobs that ain't got no ELECTROLOCK."

The Guard:—"Huh, ain't you going to be surprised. Maybe there were a lot of cars that weren't ELECTROLOCKED when you first come here, but not now, Swifty, not now. 4 out of every 5 cars have ELECTROLOCKS."

Swifty:—"Ain't that a tough break. Well, I suppose I have to go to work then."

ANOTHER SELLING POINT FOR THE CAR YOU BUILD

A thief always follows the line of least resistance. He never knowingly attempts a job where his chances of failure are greater than his chances of success. That's why theft attempts are seldom made on cars guarded by ELECTROLOCK. Car-buyers know this . . . . and by installing ELECTROLOCK in the car YOU BUILD another sales point is made.

# MITCHELL SPECIALTY COMPANY

PHILADELPHIA, PENNA. . . . DETROIT, FISHER BLDG.

# MARVEL Carburetion


Modern traffic demands modern carburetion.

The Marvel carburetor with automatic heat control insures quick warm-up and holds in reserve at all times a thoroughly vaporized full power mixture for quick get away and speed.

*Marvel carburetion is standard equipment on*

BUICK NASH OAKLAND
PONTIAC HUDSON ESSEX

MARVEL CARBURETER COMPANY
FLINT MICHIGAN